

Subject - 'DBMS'

Multivalued dependency in DBMS

Multivalued dependency occurs when there are more than one independent multivalued attributes in a table. Example 1

Consider a bike manufacture company, which produces two colors (black and white) in each model every year.

bike - model	manuf - year	color
M1001	2007	black
M1001	2007	white
M2012	2008	Black
M2012	2008	white
M222	2009	Black
M222	2009	white

Here columns manuf-year and color are independent of each other and dependent on bike-model. In this case these two columns are said to be multivalued dependent on bike-model.

These dependencies can be represented like this

bike-model  $\twoheadrightarrow$  manuf-year  
bike-model  $\twoheadrightarrow$  color



## Transitive dependency in DBMS

A functional dependency is said to be transitive if it is indirectly formed by two functional dependencies. for eg.  $\rightarrow$

$X \rightarrow Z$  is a transitive dependency if the following three functional dependencies hold true.

- $X \rightarrow Y$
- $Y \text{ does not } \rightarrow X$
- $Y \rightarrow Z$

Note :- A transitive dependency can only occur in a relation of three or more attributes. This dependency helps us normalizing the database in 3NF (3rd Normal form)

Let us take an example to understand it better.

Book	author	Author - Age
Game of Thrones	George R.R. Martin	66
Harry Potter	J. K. Rowling	49
Dying of the Light	George R.R. Martin	66



$\{ \text{Book} \} \rightarrow \{ \text{Author} \}$  if we know the Book,  
we know the author name.

$\{ \text{Author} \}$  does not  $\rightarrow \{ \text{Book} \}$

$\{ \text{Author} \} \rightarrow \{ \text{Author-Age} \}$

Therefore as the rule of transitive dependency  
 $\{ \text{Book} \} \rightarrow \{ \text{Author-Age} \}$  should hold,  
that makes sense because if we know  
the Book name we can know the  
author's age.

### First Normal form (1NF)

$\Rightarrow$  A relation will be 1NF if it contains  
an atomic value.

$\Rightarrow$  It states that an attribute of a table  
cannot hold multiple values. It must  
hold only single-value attribute.

$\Rightarrow$  First normal form disallows the multi  
valued ~~dependency~~ attribute composite  
attribute, and their combinations.



Example :- Relation EMPLOYEE is not in 1NF because of multi valued attribute EMP - PHONE

EMPLOYEE Table ↴

EMP - Id	EMP - Name	EMP - Phone	EMP - State
14	John	123456789 34912347	UP
20	Harry	89123465	Bihar
12	Sam	453218964 923184620	Punjab

The decomposition of the EMPLOYEE table into 1NF has been shown below

EMP Id	Emp - name	EMP - Phone	EMP - state
14	John	123456789	UP
14	John	349112347	UP
20	Harry	89123465	Bihar
12	Sam	453218964	Punjab
12	Sam	923184620	Punjab

The Table is in 1NF.

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