

Course Name: A Level (1st Sem)

Subject : Introduction to DBMS

Topic: Functional Dependency (FD) – Intro. (Part 1)

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Functional Dependency - Intro

Functional Dependency (FD)

Functional dependency is the relationship between attributes of a relation/table. It is introduced by *E.F. Codd*. It helps to reduce data redundancy and improve the quality of data in the database. FD is denoted by arrow sign (\rightarrow).

Let us suppose a relation R having attribute set α and β , the functional dependency between attributes set are represented by:

$$\alpha \rightarrow \beta$$

Where, α – Determinant Set and β – Dependent Set

α is functionally dependent on β which means **if we know the value of α then we can find or tell the value of β from the relation.**

If we look it more technically, we can say, $\alpha \rightarrow \beta$ holds in a relation R if and only if

- for all pairs of tuples t_1 and t_2 in the instance such that $t_1[\alpha] = t_2[\alpha]$, it is also the case that $t_1[\beta] = t_2[\beta]$.

(In other words we can say; if two or more tuples/rows of the relation have same value for attribute α then there must be also same value for attribute β .)

Functional Dependency Set

Functional Dependency set or FD set of a relation is the set of all FDs present in the relation.

Consider a following relation:

Table: student_info

s_rollno	s_fname	s_lname	s_dob	s_email	s_city
1001	Nick	Wright	15-Jan-1990	nickwr@gmail.com	Delhi
1002	Ram	Sharma	01-Oct-1988	ramsh34@gmail.com	Lucknow
1003	Ram	Kumar	05-Mar-1980		Lucknow
1004	Shayam	Sharma	15-Jan-1990	shyam34@yahoo.com	Gorakhpur
1005	Suresh	Kumar	06-Feb-1983		Delhi
1006	Suresh	Sharma	06-Feb-1985	suresh187.sh@gmail.com	Prayagraj

The functional dependency $s_rollno \rightarrow s_fname$ holds in above relation because if we know the s_rollno then we can tell the s_fname . s_fname attribute is functionally dependent on s_rollno .

But $s_fname \rightarrow s_lname$ doesn't holds in the relation. If we know the s_fname we cannot tell the exactly s_lname because for the value of "Ram" in s_fname column, there are two values "Sharma" and "Kumar" in s_lname column.

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The set of all functional dependency in above relation are:

$$\{ s_rollno \rightarrow s_fname, \\ s_rollno \rightarrow s_lname, \\ s_rollno \rightarrow s_dob, \\ s_rollno \rightarrow s_email, \\ s_rollno \rightarrow s_city \}$$

The s_rollno is **determinant** attribute and all others attributes are **dependent** attribute in above relation.

Exercise:

1. Suppose a relation R(A, B) :

A	B
1	a
2	b
3	a
4	d

$A \rightarrow B$ holds in above relation or not?
Explain it.

2. Suppose a relation R (C, D):

C	D
1	a
2	b
2	a
3	g

$C \rightarrow D$ holds in above relation or not?
Explain it.

