Types of dependencies in DBMS

Dependencies in DBMS is a relation between two or more attributes. It has the following types in DBMS −

- Functional Dependency
- Fully-Functional Dependency
- Transitive Dependency
- Multivalued Dependency
- Partial Dependency

Let us start with Functional Dependency −

Functional Dependency

If the information stored in a table can uniquely determine another information in the same table, then it is called Functional Dependency. Consider it as an association between two attributes of the same relation.

If P functionally determines Q, then

P -> Q

Let us see an example −

<Employee>

EmpID	EmpName	EmpAge
E01	Amit	28
E02	Rohit	31

In the above table, **EmpName** is functionally dependent on **EmpID** because **EmpName** can take only one value for the given value of **EmpID:**

EmpID -> EmpName

The same is displayed below −

EmpID -> EmpName

Employee Name (**EmpName**) is functionally dependent on Employee ID (**EmpID**)

Fully-functionally Dependency

An attribute is fully functional dependent on another attribute, if it is Functionally Dependent on that attribute and not on any of its proper subset.

For example, an attribute Q is fully functional dependent on another attribute P, if it is Functionally Dependent on P and not on any of the proper subset of P.

Let us see an example −

<ProjectCost>

ProjectID	ProjectCost
001	1000
002	5000

<EmployeeProject>

EmpID	ProjectID	Days (spent on the project)
E099	001	320
E056	002	190

The above relations states:

EmpID, ProjectID, ProjectCost -> Days

However, it is not fully functional dependent.

Whereas the subset **{EmpID, ProjectID}** can easily determine the **{Days}** spent on the project by the employee.

This summarizes and gives our fully functional dependency −

{EmpID, ProjectID} -> (Days)

Transitive Dependency

When an indirect relationship causes functional dependency it is called Transitive Dependency.

If P -> Q and Q -> R is true, then P-> R is a transitive dependency.

Multivalued Dependency

When existence of one or more rows in a table implies one or more other rows in the same table, then the Multi-valued dependencies occur.

If a table has attributes P, Q and R, then Q and R are multi-valued facts of P.

It is represented by double arrow −

```
->->
```

For our example:

```
P->->Q
Q->->R
```

In the above case, Multivalued Dependency exists only if Q and R are independent attributes.

Partial Dependency

Partial Dependency occurs when a nonprime attribute is functionally dependent on part of a candidate key.

The 2nd Normal Form (2NF) eliminates the Partial Dependency. Let us see an example −

<StudentProject>

StudentID	ProjectNo	StudentName	ProjectName
S01	199	Katie	Geo Location
S02	120	Ollie	Cluster Exploration

In the above table, we have partial dependency; let us see how −

The prime key attributes are **StudentID** and **ProjectNo.**

As stated, the non-prime attributes i.e. **StudentName** and **ProjectName** should be functionally dependent on part of a candidate key, to be Partial Dependent.

The **StudentName** can be determined by **StudentID** that makes the relation Partial Dependent.

The **ProjectName** can be determined by **ProjectID**, which that the relation Partial Dependent.