



SNS COLLEGE OF TECHNOLOGY, COIMBATORE-35

(AN AUTONOMOUS INSTITUTION)



DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

19CST202-DATABASE MANAGEMENT SYSTEM

UNIT-III

Database Design

Topic: Closure Set of FD's

Closure Of Functional Dependency :

- The Closure Of Functional Dependency means the complete set of all possible attributes that can be functionally derived from given functional dependency using the inference rules known as Armstrong's Rules.
- If "F" is a functional dependency then closure of functional dependency can be denoted using " $\{F\}^+$ ".
- There are three steps to calculate closure of functional dependency. These are:

Step-1 : Add the attributes which are present on Left Hand Side in the original functional dependency.

Step-2 : Now, add the attributes present on the Right Hand Side of the functional dependency.

Step-3 : With the help of attributes present on Right Hand Side, check the other attributes that can be derived from the other given functional dependencies. Repeat this process until all the possible attributes which can be derived are added in the closure.

Closure Of Functional Dependency : Examples

Example-1 : Consider the table student_details having (Roll_No, Name, Marks, Location) as the attributes and having two functional dependencies.

FD1 : Roll_No → Name, Marks

FD2 : Name → Marks, Location

Now, We will calculate the closure of all the attributes present in the relation using the three steps mentioned below.

Step-1 : Add attributes present on the LHS of the first functional dependency to the closure.

$\text{Roll_no}^+ = \{\text{Roll_No}\}$

Step-2 : Add attributes present on the RHS of the original functional dependency to the closure.

$\{\text{Roll_no}\}^+ = \{\text{Roll_No}, \text{Marks}\}$

Step-3 : Add the other possible attributes which can be derived using attributes present on the RHS of the closure. So Roll_No attribute cannot functionally determine any attribute but Name attribute can determine other attributes such as Marks and Location using 2nd Functional Dependency($\text{Name} \rightarrow \text{Marks, Location}$).

Therefore, complete closure of Roll_No will be :

$\{\text{Roll_no}\}^+ = \{\text{Roll_No}, \text{Marks}, \text{Name}, \text{Location}\}$