

Find the canonical cover of FD {A->BC, B->AC, C->AB} in DBMS

Canonical cover is called minimal cover which is called the minimum set of FDs. A set of FD FC is called canonical cover of F if each FD in FC is a Simple FD, Left reduced FD and Non-redundant FD.

Simple FD – $X \rightarrow Y$ is a simple FD if Y is a single attribute.

Left reduced FD: $X \rightarrow Y$ is a left reduced FD if there are no extraneous attributes in X. {extraneous attributes: let $XA \rightarrow Y$ then A is a extraneous attribute if $X \rightarrow Y$ }

Non-redundant FD – $X \rightarrow Y$ is a Non-redundant FD if it cannot be derived from F- { $X \rightarrow y$ }.

Problem

Find the canonical cover of FD {A->BC, B->AC, C->AB}.

Solution

Relational schema R(A,B,C) F: {A->BC, B->AC, C->AB}

Step 1 – Create a singleton right hand side

dependency A->BC will break into A->B, A->C.

F: { A->B
A->C
B->A
B->C
C->A
C->B}

Step 2 – Remove extraneous attributes if any exists.

F: { A->B
A->C
B->A
B->C
C->A
C->B} NO extraneous attributes exists

Step 3 – Remove the redundant FD

F: { A- >B
 A- >C
 B- >A
 B- >C
 C- >A
 C- >B }

Remove B->A dependency and we can get A from B through B->C and C->A.

F= {A->B
 A->C
 B->C
 C->A
 C->B}

By removing C->B dependency we get B from C through C->A , A->B.

F={A->B
 B->C
 C->A
 A->C}

By removing A->C dependency we can determine C from A through A->B, B->C

Step 4 – The final canonical cover is as follows –

FC = { A->B, B->C, C->A }
 [A]⁺ = BC
 [B]⁺ = AC
 [C]⁺ = AB.