Lossless Join Decomposition

Properties :

1) Attributes(R1) U Attributes (R2) = attributes(R)
2) Attributes(R1) intersection Attributes (R2) != Null
3) Common attribute should be super key for atleast one decomposed relation.

Example 1 :

R(A,B,C) is divided into R1(A,B) and R2(B,C)
R(A,B,C) =

A	B	C
1	1	1
2	1	2
3	2	1
4	3	2

R1(A,B) =

A	B
1	1
2	1
3	2
4	3

R2(B,C)=

B	C
1	1
1	2
2	1
3	2

Answer:

We will perform cartesian join on R1 and R2 by considering following data.

R1(A,B) =

A	B
1	1
2	1
3	2
4	3

R2(B,C)=

B	C
1	1
1	2
2	1
3	2

R1 X R2 =

A	B	B	C
1	1	1	1
1	1	1	2
1	1	2	1
1	1	3	2
2	1	1	1
2	1	1	2
2	1	2	1
2	1	3	2
3	2	1	1
3	2	1	2
3	2	2	1
3	2	3	2
4	3	1	1
4	3	1	2
4	3	2	1
4	3	3	2

Compute natural join of R1 and R2 (Consider R1.B = R2.B)

Hence R1 Natural Join R2 =

A	B	C
1	1	1
1	1	2
2	1	1
2	1	2
3	2	1
4	3	2

Not the same relation. Hence not a lossless join decomposition.

Example 2:

R(A,B,C) is divided into R1(A,B) and R2(A,C)

R(A,B,C) =

A	B	C
1	1	1
2	1	2
3	2	1
4	3	2

R1 (A,B) =

A	B
1	1
2	1
3	2
4	3

R2(A,C)=

A	C
1	1
2	2
3	1
4	2

Answer:

Apply all above steps and we get,

R1 Natural Join R2 :

A	B	C
1	1	1
2	1	2
3	2	1
4	3	2

Here A is Candidate key and it is super key as well. Hence third property is also satisifed.

And R1 Natural Join R2 = R

Hence, Lossless join decomposition