

Lossless-join, Dependency Preserved Decomposition to 3NF.

- Given a relation R with a minimal set of FDs.
- Find a lossless-join decomposition of the R to BCNF.
- For every FD $X \rightarrow A$ which is not preserved after the decomposition, create a new relation with the schema XA .
- If the two relations $R1(X)$ and $R2(Y)$ exist where $X \subseteq Y$ delete $R1(X)$

1 Example

FDs:

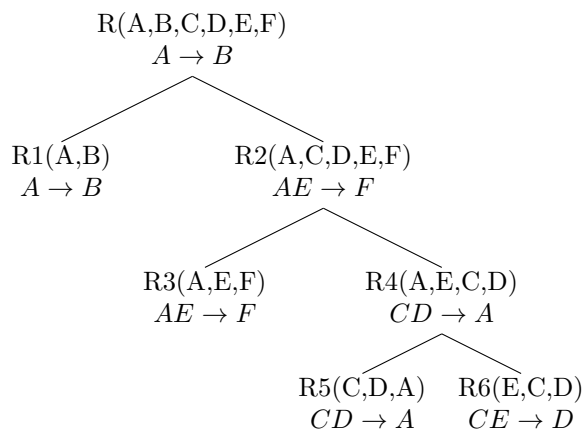
$A \rightarrow B, A^+ = AB$

$CE \rightarrow D, CE^+ = CDEABF$

$BC \rightarrow D, BC^+ = BCDAB$

$AE \rightarrow F, AE^+ = AEFB$

$CD \rightarrow A, CD^+ = CDAB$



The leaves of the tree are the relations that will create a lossless-join in BCNF. However, because $BC \rightarrow D$ is missing from the FD we create a new relation $R7(B,C,D)$ and use that in conjunction with the relations created from the decomposition to create a lossless-join, dependency perserving decomposition in 3NF.

2 Why do we want to preserve the FDs?

2.1 Answer

In order to maintain dependency constraint on the set of relations, one may have to join the table in order to check such constraint. Joining a table is computationally intensive and may lead to performance problems if the constraint is checked multiple times.

3 Summary

1. No redundancy (trade off with Dependency preserving)
2. Minimal number of relations
3. Lossless join (Necessary)
4. Dependency preserving (trade off with no redundancy)