

Tutorial 2 (Solution)

CSN-351/AID-523 Database Management Systems

1. (AH, DH), ABCDE, B
2. Yes, (Attribute closure)
3. A,B,C
If all FDs of S1 can be determined from FDs that are present in S2, we can conclude that $S2 \supset S1$.
If all FDs of S2 can be determined from FDs that are present in S1, we can conclude That $S1 \supset S2$.
If 1 and 2 are satisfied then, $S1=S2$ are semantically equivalent
4. D (if F cover G $(F \supseteq G)$
G cover F $(G \supseteq F)$ then it is a $F=G$)
5. > Canonical cover is free from all the extraneous functional dependencies.
> The closure of canonical cover is the same as that of the given set of functional dependencies.
> Canonical cover is not unique and may be more than one for a given set of functional dependencies.
 $X \rightarrow W$
 $WZ \rightarrow Y$
 $Y \rightarrow X$
 $Y \rightarrow Z$

Steps 1: Write the given set of functional dependencies in such a way that each functional dependency contains exactly one attribute on its right side.

Step 2: Consider each functional dependency one by one from the set obtained in Step-0

Step 3: Determine whether it is essential or non-essential.

To determine whether a functional dependency is essential or not, compute the closure of its left side-

- Once by considering that the particular functional dependency is present in the set
- Once by considering that the particular functional dependency is not present in the set

If the results came out to be the same, this means presence or absence of dependency does not create difference, it is non-essential and we can eliminate it. And if result doesn't come out to be same, then it is essential and we can't remove that dependency

Next check if there is any functional dependency that contains more than one attribute on its left side.

For Case No: set obtained is our canonical cover .

For Case Yes: Consider a functional dependency and Compute the closure of all the possible subsets of the left side of that functional dependency.

>If any of the subsets produce the same closure result as produced by the entire left side, then replace the left side with that subset.

After this step is complete, the set obtained is the canonical cover

6 A, B, C , D

7. Lossless decomposition

(Check for this this rule to identify if decomposition is lossy or not)

a) $R_1 \cup R_2 = R$

b) $R_1 \cap R_2 \neq \emptyset$

c) $R_1 \cap R_2 = \text{Super key of } R_1 \text{ or } R_2$