

## Lossless joins

- It is the ability to ensure that any instance of the original relation can be identified from corresponding instances in the smaller relations.
- A decomposition  $\{R_1, R_2, \dots, R_n\}$  of a relation  $R$  is called a lossless decomposition for  $R$  if the natural join of  $R_1, R_2, \dots, R_n$  produces exactly the relation  $R$ .
- Decomposition is lossless if :
  - $X \cap Y \rightarrow X$  (*all attributes common to both  $X$  and  $Y$  functionally determine ALL the attributes in  $X$* ).
  - $X \cap Y \rightarrow Y$  (*all attributes common to both  $X$  and  $Y$  functionally determine ALL the attributes in  $Y$* )
  - If  $X \cap Y$  forms a super key of either  $X$  or  $Y$