

Make-up Homework

Problem 1:

Let $R(A, B, C, D, E)$ be decomposed into relations $R_1(A, B, C)$, $R_2(B, C, D)$ and $R_3(A, C, E)$. For each set of FDs below, use the chase to determine whether the decomposition is lossless and if it is not, give an example of an instance of R that returns more than R after projection and equi-join.

20 pts (1) $B \rightarrow E, CE \rightarrow A, AE \rightarrow D, AC \rightarrow E$

20 pts (2) $CD \rightarrow E, ACD \rightarrow E, AC \rightarrow B$

Problem 2:

What are the closures of all subsets of attributes for the following tables R and S. Which set of attributes are keys and which ones are superkeys.

20 pts 1. $R(A, B, C, D)$ and $\{AB \rightarrow D, BC \rightarrow D, CD \rightarrow A\}$

20 pts 2. $S(A, B, C, D)$ and $\{AD \rightarrow B, BD \rightarrow C, CD \rightarrow A\}$

Problem 3:

For the following schemata, decide (with reason given) whether the table is in BCNF or not. If not, show a decomposition into BCNF or argue that this is impossible.

10 pts (1) Problem:

$R(\text{Manager}, \text{Project}, \text{Location})$ with FDs

$\text{Manager} \longrightarrow \text{Location}$

and

$\text{Project}, \text{Location} \longrightarrow \text{Manager}.$

10 pts (2) Problem:

$R(\text{itemCode}, \text{quantity}, \text{price}, \text{description})$ with FD

$\text{itemCode} \longrightarrow \text{description}.$