CS4.301: Data and Applications (Monsoon 2024)

Homework - 4

Submission Deadline: Nov 20, 2024

Part One

Consider the attribute set $R = ABCDEGH$ and the FD set $F = \{AB \rightarrow C, AC \rightarrow B, AD \rightarrow E, B \rightarrow D, BC \rightarrow A, E \rightarrow G\}$.

1. For each of the following attribute sets, do the following: (i) Compute the set of dependencies that hold over the set and write down a minimal cover. (ii) Name the strongest normal form that is not violated by the relation containing these attributes. (iii) Decompose it into a collection of BCNF relations if it is not in BCNF.

   (a) ABC (b) $ABCDE$ (c) $ABCG$ (d) $DEGH$ (e) $ABCEH$

2. Which of the following decompositions of $R = ABCDEG$, with the same set of dependencies F, is (a) dependency-preserving? (b) lossless-join?

   (a) $\{AB, BC, ABDE, EG\}$

   (b) $\{ABC, ACDE, ADG\}$

Part Two

Table : PURCHASES

Customer ID	Order ID	Product ID	Cust Name	Product Name	Phn Nos	Day	Discount

Convert the relational table to a) 1NF b) 2NF c) 3NF

Information about the table :

1. Composite Key is Customer ID + Order ID + Product ID
2. Phn Nos is a multi-valued attribute.
3. Day → Discount
4. Customer ID → Phn Nos
5. Customer ID → Cust Name
6. Product ID → Product Name
7. Order ID → Day

Submission Instructions

Please submit a single PDF from the team named as <team_number>.pdf (without the < and >). Handwritten submissions are not allowed.