CSC343 Worksheet 13 Solution

July 4, 2020

1. a) **Notes:**

- Decomposition: The good bad and ugly
 - 1) Elimination of Anomalies by decomposition as in Section 3
 - 2) **Recoverability of Information** Can we recover the original relation from the tuples in its decomposition?
 - 3) Preservation of Dependences (lossless join): Can we be sure that after reconstructing the original relation from the decompositions, the original FD's satisfy?

BCNF: \rightarrow satisfies 1) and 2) Not good. NONO

- The Chase Test for Lossless Join
 - Tests whether the decomposition is lossless

Input:

- A relation R
- A decomposition of R
- A set of functional dependencies

Output:

- Whether the decomposition is loseless or not
- $\Pi_{S_1}(R) \bowtie \Pi_{S_2}(R) \bowtie \cdots \prod_{S_i}(R) = R$

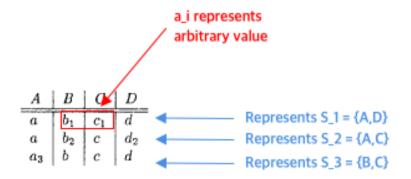
Three things to remember:

- 1. The natural join is associate and commutative
- 2. Any tuple t in R is surely in $\pi_{S_1}(R) \bowtie \pi_{S_2}(R) \bowtie \cdots \bowtie \pi_{S_k}(R)$.
- 3. We have to check to see any tuple in the $\pi_{S_1}(R) \bowtie \pi_{S_2}(R) \bowtie \cdots \bowtie \pi_{S_k}(R)$.

Example:

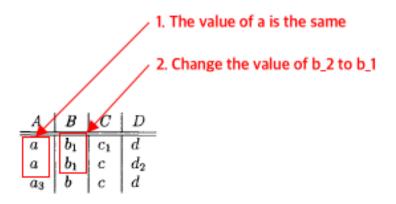
$$S_1 = \{A, D\}, S_2 = \{B, C\}, S_3 = \{A, C\}$$

$$A \to B, \, B \to C, \, CD \to A$$



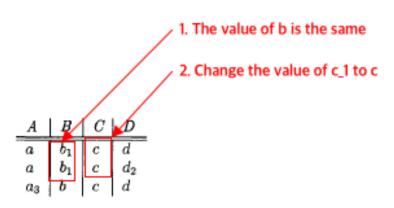
Step 1: $A \rightarrow B$

Set the value b with the same value of a to be the same. (e.g. $b_2 \rightarrow b_1$)



Step 2: $B \to C$

Set the value c with the same value of b to be the same. (e.g. $b_2 \rightarrow b_1$)



Step 3: $CD \rightarrow A$

Set the value a with the same value of c and d to be the same. (e.g. $a_3 \rightarrow a$)

