

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 Dependencies (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 lossless or not
- $\Pi_{S_1}(R) \bowtie \Pi_{S_2}(R) \bowtie \cdots \Pi_{S_k}(R) = R$

Three things to remember:

1. The natural join is associative 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_i represents arbitrary value

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	
<i>a</i>	<i>b</i> ₁	<i>c</i> ₁	<i>d</i>	← Represents <i>S</i> _1 = { <i>A</i> , <i>D</i> }
<i>a</i>	<i>b</i> ₂	<i>c</i>	<i>d</i> ₂	← Represents <i>S</i> _2 = { <i>A</i> , <i>C</i> }
<i>a</i> ₃	<i>b</i>	<i>c</i>	<i>d</i>	← Represents <i>S</i> _3 = { <i>B</i> , <i>C</i> }