

# 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
- $\Pi_{S_1}(R) \bowtie \Pi_{S_2}(R) \bowtie \dots \bowtie \Pi_{S_i}(R) = R$

**Three things to remember:**

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

**Example:**

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

$A \rightarrow B, B \rightarrow C, CD \rightarrow A$

a<sub>i</sub> represents  
arbitrary value

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

Step 1:  $A \rightarrow B$