



## Assignment 1: Anomalies in Relational Model

Consider the following table

<u>Eid</u>	<u>EName</u>	<u>Dept</u>	Salary	Address
100	John	Sales	10000	Ulm
101	Smith	Production	20000	Bonn
100	John	Production	15000	Ulm
101	Smith	Automation	20000	Bonn

- (a) If you want to insert the following rows into the above table, do these insertions cause any anomalies? Justify.
- (i) (102, James, Null, 15000, Berlin)
  - (ii) (100, Nick, Manufacturing, 10000, Turin)
- (b) If you change the 3rd row in the above table to (100, John, Production, 20000, Berlin), does it cause any anomalies? If so, why?
- (c) Suppose you want to delete the 4th row from the above table. Does it cause any anomalies? Justify your answer.

## Assignment 2: Functional Dependencies

- (a) Find out all the functional dependencies in the previous table.
- (b) Consider Relation 'R' containing columns A, B, C, D, E and functional dependencies  $FD = \{A \rightarrow B, B \rightarrow D, C \rightarrow DE, CD \rightarrow AB\}$ . Find out all the candidate keys.
- (c) Find the minimal cover of  $\{A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H\}$ .
- (d) Check whether the two functional dependencies 'F' and 'G' are equivalent or not.  $F = \{A \rightarrow B, B \rightarrow C, C \rightarrow D\}$

## Assignment 3: Normal Forms

- (a) Relation R (ABCDEF) and  $FD : \{EC \rightarrow AD, A \rightarrow B, C \rightarrow F\}$ . Does it satisfy 2NF and why? If not, decompose the table in such a way that they satisfy at least 2NF. Find out the highest normal satisfied by the decomposed table.
- (b) Relation R(A B C D) and  $FD : \{A \rightarrow BC, A \rightarrow D, B \rightarrow D\}$ . What is the highest normal form it is satisfying? Does it satisfy 3NF? If not, split the table and rewrite the functional dependencies of each table so that it satisfies 3NF.

- (c) Relation  $R(P, Q, R, S, T)$  and  $FD : \{ P \rightarrow QR, RS \rightarrow T, Q \rightarrow S, T \rightarrow P \}$ . Is the decomposition of  $R$  into  $R_1(P, Q, R)$  and  $R_2(P, S, T)$  lossless and dependency preserving? Justify your answer.
- (d) Justify why a relation with only two attributes is always in BCNF?