CS2102 Database Systems

AY 2017/18 Semester I

Tutorial 8 (Week12): Normalization

1. For each of the following schema decompositions, determine whether or not
   - (i) it is a lossless-join decomposition, and
   - (ii) (ii) it is a dependency-preserving decomposition.

   a. R(A,B,C,D) with FDs F = { A→BCD, C→D } and decomposition { R1(A,B,C), R2(C,D) }.

   b. R(A,B,C,D) with FDs F = { A→BCD, C→D } and decomposition { R1(A,C), R2(A,B,D) }.

   c. R(A,B,C,D,E) with FDs F = { AB→C, AC→D, E→ABCD } and decomposition { R1(A,B,C), R2(A,B,E), R3(A,C,D) }.

2. Consider the schema R(A, B, C, D, E) with FDs F = { A→B, BC→E, ED→A }.
   a. List all the keys of R.
   b. Is R in BCNF?
   c. Is R in 3NF?

3. Consider the schema R(A, B, C, D, E) with FDs F = { A→E, AB→D, CD→AE, E→B, E→D }.
   a. Find a minimal cover for F.
   b. List all the keys of R.
   c. Is R in BCNF? If not, find a BCNF decomposition of R.
   d. Is R in 3NF? If not, find a 3NF decomposition of R.