CS2102 Tutorial 10: 3NF

Wk ~~13~~, Sem 2, 2021/22

Questions to be discussed: No tutorial on Week 13, answers will be given.

1. For each of the following schema decomposition, determine whether or not it is a dependency-preserving decomposition.
   (a) Schema $R(A, B, C, D)$ with $F = \{A \to BCD, C \to D\}$ and decomposition $\{R1(A, B, C), R2(C, D)\}$
   (b) Schema $R(A, B, C, D)$ with $F = \{A \to BCD, C \to D\}$ and decomposition $\{R1(A, C), R2(A, B, D)\}$
   (c) Schema $R(A, B, C, D, E)$ with $F = \{AB \to C, AC \to D, E \to ABCD\}$ and decomposition $\{R1(A, B, C), R2(A, B, E), R3(A, C, D)\}$

2. Consider the schema $R(A, B, C, D)$ with $F = \{ABC \to D, D \to A\}$.
   (a) Is R in BCNF? Explain.
   (b) Is R in 3NF? Explain.

3. Consider the schema $R(A, B, C, D)$ with $F = \{A \to E, CD \to A, E \to B, E \to D, A \to BD\}$.
   (a) Is R in 3NF? Explain.
   (b) If R is not in 3NF, find a 3NF decomposition of R.
   (c) Is your decomposition in (b) in BCNF?

4. Consider the schema $R(A, B, C, D, E)$ with $F = \{AB \to CDE, AC \to BDE, B \to C, C \to B, C \to D, B \to E\}$.
   (a) Is R in 3NF? Explain.
   (b) If R is not in 3NF, find a 3NF decomposition of R.
   (c) Is your decomposition in (b) in BCNF?