University of Toronto
CSC343, Summer 2019

Lecture Prep for Week 10

Questions

1. Consider relation $R(A, B, C, D, E, F)$ with functional dependencies S.

$$S = \{CD \to A, \quad B \to EF, \quad A \to BC, \quad F \to D\}$$

   (a) Which functional dependencies indicate a violation of BCNF?

   (b) Create an instance of R that satisfies its FDs and has redundant data. Identify the redundancy, and explain what it has to do with the FDs.

   (c) Suppose we use the functional dependency $B \to EF$ in the first step of the BCNF decomposition algorithm to decompose R. What two new relations will replace R?

   (d) Project the FDs onto these two relations.

   (e) Is the new schema, with these two relations, in BCNF, or would we have to recurse and continue decomposing?

2. Suppose we are employing the 3NF synthesis algorithm on a relation $R(A, B, C, D, E)$, and we already have the following minimal basis:

$$S = \{A \to DE \quad C \to A, \quad E \to A\}$$

   (a) List all the keys for relation R

   (b) How do you know that nothing else is a key?

   (c) Show the final schema produced by the 3NF algorithm. Explain your answer in terms of the steps of the algorithm. Do not project the functional dependencies onto the relations, just show the relations.

Submitting

Type up your answers. LaTeX or Word is fine. Submit your work in a pdf file called "prep10.pdf" on MarkUs.