DATABASES

ADIT

Lab Compendium – Lab 3 (Normalization)

Institutionen för datavetenskap (IDA), Linköpings universitet

Lab 3; Normalization

Objectives

The purpose of this lab is to arrive at an understanding of i) the Armstrong rules for deriving functional dependencies, ii) the attribute closure algorithm, iii) the Boyce-Codd normal form (BCNF), and iv) the BCNF decomposition algorithm.

Background Reading

Lecture notes and book material on functional dependencies and normalization.

The Lab

1) Consider the relation schema R(A, B, C, D, E, F) and the set of functional dependencies F = { FD1: A → BC; FD2: C → AD; FD3: DE → F }. Use the Armstrong rules to derive each of the following two functional dependencies. In both cases, describe the derivation process step by step (i.e., which rule did you apply to which FDs).

   a) C → B b) AE → F

2) For the aforementioned relation schema with its functional dependencies, compute the attribute closure X^+ for each of the following two sets of attributes.

   a) X = { A } b) X = { C, E }

3) Consider the relation schema R(A, B, C, D, E, F) with the following FDs

   FD1: AB → CDEF
   FD2: E → F
   FD3: D → B

   a) Determine the candidate key(s) for R.

   b) Note that R is not in BCNF. Which FD(s) violate the BCNF condition?

   c) Decompose R into a set of BCNF relations, and describe the process step by step (don't forget to determine the FDs and the candidate key(s) for all of the relation schemas along the way).

4) Consider the relation schema R(A, B, C, D, E) with the following FDs

   FD1: ABC → DE
   FD2: BCD → AE
   FD3: C → D

   a) Show that R is not in BCNF.

   b) Decompose R into a set of BCNF relations (describe the process step by step).

Handing in

- Answers to the lab question