CS2102 Database Systems

AY 2017/18 Semester I

Tutorial 7 (Week11): Functional Dependencies

1. Consider a relational schema R with attributes sets X, Y, Z $\subseteq$ R. Use Armstrong's Axioms to prove the following rules:
   a. **Union rule:** If X → Y and X → Z, then X → YZ
   b. **Pseudo-transitivity:** If X → Y and Z → W and Z $\subseteq$ Y, then X → W

2. Consider R(A, B, C, D, E) with FDs F = { {A,B,C} → {E}, {B,D} → {A}, {C,G} → B} }.
   a. Use Extended Armstrong's Axioms to show that F implies CDG → E.
   b. Compute CDG+
   c. Find all the keys of R.

3. Consider the set of functional dependencies F = { {A} → {B}, {C} → {D}, {B,D} → {E}, {D} → {A,D}, {A,C} → {E,B} } on the relation R(A, B, C, D, E).
   a. Give an example instance of R that complies with the functional dependencies.
   b. Give an example instance of R that violates the functional dependencies.
   c. Give an example of a trivial functional dependency in F+.
   d. Give an example of a completely non-trivial functional dependency in F+.
   e. Compute a minimal cover of F.