CS2102 Database Systems
2014/2015 Semester I

Tutorial #4   Functional Dependencies

1. Is the following rule correct?

    $\forall X \in R \; \forall Y \in R \; (\text{if } X \rightarrow Y \text{ then } Y \subseteq X)$

2. The following rule is called pseudo-transitivity. Use Armstrong axioms to prove it.

    $\forall X \in R \; \forall Y \in R \; \forall Z \in R \; \forall W \in R \; (\text{if } X \rightarrow Y \text{ and } Z \rightarrow W \text{ and } Z \subseteq Y, \text{ then } X \rightarrow W)$

3. Consider the set of functional dependencies:

    $F = \{ \{A\} \rightarrow \{B\}, \{C\} \rightarrow \{D\}, \{B, D\} \rightarrow \{E\}, \{D\} \rightarrow \{A, D\}, \{A, C\} \rightarrow \{E, B\} \}$ on the relation scheme $R = \{A, B, C, D, E\}$.

    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. Compute F^+, the closure of F.

    d. Give an example of a trivial functional dependency in F^+.

    e. Give an example of a non-trivial functional dependency in F^+.

    f. Compute $\{C\}^+$, the closure of the set of attributes $\{C\}$.

    g. Compute a minimal cover of F.