DATABASE SYSTEMS

Tutorial 5

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Problem 1. Consider the following set of FDs:

$$D \to AC\,, \qquad AB \to DE\,, \qquad FD \to E\,, \qquad C \to F$$

(a) Determine whether each of the following FDs is implied by the FDs above:

$AC \to E$	$BD \to EF$	$EF \to BC$	$BC \to BF$
$AD \to CF$	$ABC \to DF$	$DEF \to AB$	$DF \to AE$
$CD \to DE$	$BE \to AC$	$CD \to ED$	$DE \to AF$

(b) For each of the FDs in point (a) that are implied, give a derivation using the Armostrong's axioms.

Problem 2. Consider a schema with attributes A, B, C, D, E, F and FDs

$$D \to A\,, \qquad F \to B\,, \qquad DF \to E\,, \qquad B \to C$$

(a) Find the prime attributes and candidate keys of the schema.

(b) Is the schema in BCNF? Justify your answer.

Problem 3. Let R, S and T be relations on attributes A, B, C. Given the following set of INDs:

$$R[A, B] \subseteq S[B, C] \qquad\qquad S[B, C] \subseteq T[C, A]$$

determine which of the following INDs are implied:

$R[A] \subseteq T[A]$	$R[B] \subseteq T[B]$	$R[C] \subseteq T[C]$
$R[A] \subseteq T[B]$	$R[B] \subseteq T[A]$	$R[B] \subseteq T[C]$
$R[C] \subseteq T[B]$	$R[A] \subseteq T[C]$	$R[C] \subseteq T[A]$

Problem 4. Consider the schema over attributes A, B, C, D, E, F and the following set of FDs:

$$EF \to BC\,, \qquad A \to D\,, \qquad B \to AE\,, \qquad BD \to C$$

(a) Find all candidate keys and prime attributes of the schema.

(b) Is the schema in BCNF? Justify your answer.