Introduction to Databases

Tutorial 5 Solutions

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Problem 1

(a)

Note: the four given FDs are refered to by their number

(1) $D \Rightarrow AC$ does not hold with witness rows=(1,2), D=(3,3), AC=((1,2),(2,2)).

(2) $AB \Rightarrow DE$ holds.

(3) $FD \Rightarrow E$ does not hold with witness rows=(1,2), F/D=(4,3), E=(0,1).

(4) $C \Rightarrow F$ holds.

(b) and (c)

$AC \Rightarrow E$

$BD \Rightarrow EF$

$EF \Rightarrow BC$

$BC \Rightarrow BF$

$AD \Rightarrow CF$ implied by,

(5) $D \Rightarrow C$ by decomposition of (1)
(6) $D \Rightarrow CF$ by union of (1) and (5)
(7) $AD \Rightarrow ACF$ by augmentation of (6)
(8) $AD \Rightarrow CF$ by decomposition of (7)

$ABC \Rightarrow DF$ implied by,

(9) $D \Rightarrow F$ by transitivity of (5) & (4)
(10) $AB \Rightarrow D$ by decomposition of (2)
(11) $AB \Rightarrow DF$ by union of (9) & (10)
(12) $ABC \Rightarrow DFC$ but augmentation of (11)
(13) $ABC \Rightarrow DF$ by decomposition of (12)

$DEF \Rightarrow AB$

$DF \Rightarrow AE$

$CD \Rightarrow DE$

$BE \Rightarrow AC$

$CD \Rightarrow ED$

$DE \Rightarrow AF$

Problem 2