Tutorial 4 Solutions

CSN-351/AID-523 Database Management Systems

1. a. True

   b. False.

   For 3NF : either X is super key OR Y is a prime attribute.

   c. False.

   The table must be in 1NF first.

   d. True

   All possible FD's in FD set will always follow condition of BCNF. Possible FD's with 2 attributes ::

   {} -> valid BCNF

   {A—>B} -> A is superkey

   {B—>A} -> B is superkey

   {A—>B, B—>A} -> A is superkey, B is superkey

   {AB—>AB} -> AB is superkey.

   … and so on

   e. True

   f. True

   All candidate keys have only 1 attribute in them. Hence those attributes will be prime attributes. Hence a prime attribute can only be derived from a super key. Hence R is in BCNF also.

   g. False

   Not necessary.

   h. True

2. A,B,C,D all are valid.

3. Not in 2NF as the following partial dependencies exists :

{AB—>C, B—>F, A—>E}

Decomposing R into R1(ABC), R2(ABD), R3(BF), R4(AEG) can help us achieve 2NF

4. a. Not in 3NF due to FD's {C—>D, D—>E} not following 3NF. Also {B—>DF} does not follow 2NF.

Decomposing R into R1(ABC), R2(CD), R3(DF), R4(BF) will help to achieve 3NF.

b. No as R2(CDE) along with FD {D—>E} will violate rules of 3NF. As for R2 , candidate key = {C} -> prime attributes = {C}.

5. a. Not in BCNF due to {D—>A}. It is in 3NF not in BCNF

b. YES

c. YES

6. a. MVD set = {L->->C, L->->B}

b. No as L is not a super key. For 4NF and MVD :: X->->Y , X must be a super key.

c. R1(LC) :

L	C
L1	C1
L1	C2
L2	C2

R2(LB) :

L	B
L1	B1
L1	B2
L2	B2

No more MVD’s exists now in R1 or R2.

Total cells initially :: 3*5 = 15
Total cells at present :: 6 + 6 = 12
Total reduced cells = 15 - 12 = 3
Total saved memory = 3Bytes