

Task 1.

Case number one (1)

1. Indicate all the BCNF violations.

- ABE Gives Us (A,B,C,D,E) – Minimum candidate key
- ABCE Gives Us (A,B,C,D,E) – SuperKey
- $AB \rightarrow C$ is non trivial and it's LHS is not a super key, therefore it violates BCNF form

2. Decompose the relations (BCNF)

there were more iterations but this is the final one which contains given FD's

B, D having FD $B \rightarrow D$.

A, B, C having FD $A, B \rightarrow C$.

A, B, E having FD (none).

C, D, E having FD $D, E \rightarrow C$.

I went with ABE(Candidate key) because $A+B$ gives us ABCD and E gives us E

The minimal cover we get is $ab \rightarrow c$, $de \rightarrow c$, $b \rightarrow d$.

The ab is not a superkey, and it seemed reasonable to split the table into 2 table

$r1 = a,b,c,d$

$r2 = a,b,e$

or

$r1 = b,d$

$r2 = a,b,c$

3. Indicate all 3NF violations.

It doesn't follow 2NF, therefore it violates 3NF.

4. Decompose the relations (3NF)

B, D having FD $B \rightarrow D$.

A, B, C having FD $A, B \rightarrow C$.

C, D, E having FD $D, E \rightarrow C$.

A, B, E having FD (none).

again I went with ABE(Candidate key) here.

With that said the table will be split into two with the minimal cover we get

using $A+B$, we get same FD's as BCNF relation decompose:

$ab \rightarrow c$, $de \rightarrow c$, $b \rightarrow d$.

$AB \rightarrow C$ and with that FD AB is not a superkey

$r1 = a,b,c,d$

$r2 = a,b,e$

or

$r1 = b,d$

$r2 = a,b,c$