# Assignment 3 Group10

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1. a)

$\{A\} \to \{B,C\} \Rightarrow \{A\} \to \{B\}$

$\{C\} \to \{A,D\} \Rightarrow \{C\} \to \{A\}$

Decomposition

Transistivity

$\Rightarrow \{C\} \Rightarrow \{B\}$

b)

FD3 : $\{D,E\} \to \{F\}$

$\{C\} \to \{D\}$ & $\{C\} \to \{A\}$ from decomposition together

gives $\{A\} \to \{D\}$ (1)

FD3 and (1) gives $\{A,E\} \to \{F\}$ through Pseudo-transitivity. ∴

2.    $R(A, B, C, D, E, F)$

FD1: $\{A\} \rightarrow \{B, C\}$

FD2: $\{C\} \rightarrow \{A, D\}$

FD3: $\{D, E\} \rightarrow \{F\}$

a)

$$X^+ = \{A\} \overset{FD1}{=} \{A, B, C\} \overset{FD2}{=} \{A, B, C, D\}$$

b)

$$X^+ = \{C, E\} \overset{FD2}{=} \{A, C, D, E\} \overset{FD1}{=} \{A, B, C, D, E\} \overset{FD3}{=}$$

$$= \{A, B, C, D, E, F\}$$

3.

R = (A, B, C, D, E, F)

FD1 = {A, B} → {C, D, E, F}

FD2 = {E} → {F}

FD3 = {D} → {B}

a) Candidate keys: {A, B}, {A, D}

b) FD2 and FD3

c)
Break up R with FD3

R1 = {B, D}

FD4 = {D} → {B}, Candidate key = D.

R2 = {A, C, D, E, F}

FD5 = {E} → {F}

FD6 = {A, D} → {C, D, E, F}, Candidate key = {A, D}

Break up R2 with FD5:

R2X = {E, F}

FD7 = {E} → {F}, candidate key = {E}

R2Y = (A, C, D, E)

FD8 = {A, D} → {C, D, E}, candidate key = {A, D}

4.a   R(A,B,C,D,E)

FD1: $\{A,B,C\} \rightarrow \{D,E\}$
FD2: $\{B,C,D\} \rightarrow \{A,E\}$
FD3: $\{C\} \rightarrow \{D\}$

a)   R is not BCNF

1. $\{A,B,C\}^+ = \{A,B,C\} \xrightarrow{FD1} \{A,B,C,D,E\}$   ok!

2. $\{B,C,D\}^+ = \{B,C,D\} \xrightarrow{FD2} \{A,B,C,D,E\}$   ok!

3. $\{C\}^+ \xrightarrow{FD3} \{C,D\}$       not a candidate key $\Rightarrow$ R is not BCNF

b)   Break up R into R1 and R2:

R1 = $\{C,D\}$       with   FD1: $\{C\} \rightarrow \{D\}$,   ck = C
R2 = $\{A,B,C,E\}$   with FD5: $\{A,B,C\} \rightarrow \{E\}$,   ck = A,B,C