Hw4 q1

#1 R(A, B, C, D, E, F)

R1(A, B, C, F)

R2(A, D, E)

FD: $A \to BC$.

$CD \to E$

$B \to D$

$E \to A$

Lossless-Join Decomposition:

$R(X, Y, Z) \to R_1(X, Y)$ $R_2(Y, Z)$ is lossless-join if $Y \to X$, $Y \to Z$

Y is the shared attri.

That's to say, shared attributes need to be the key of R1 or R2.

Answer: shared attribute is: A.

Does $A \to BCF$?

OR Does $A \to DE$?

check $A \rightarrow BCF$?

$\{A\}^+ = \{A\ B\ C\}$

$\{A\}^+ = \{A\ B\ C\ D\}$

$\{A\}^+ = \{A\ B\ C\ D\ E\}$

Thus. $A \rightarrow DE$ is correct,

Therefore: the Decomposition of R is lossless

#2

A	B	C
a_1	b_1	c_2
a_1	b_1	c_2
a_2	b_1	c_1
a_2	b_1	c_3

FD:

$A \to B$

$C \to B$

$AC \to B$

$A \to B$?

同样的 A 只能指向同样的 B.

$A \to B$?

$a_1 \to b_1$ ✓

$a \to b_1$

$A \to C$?

$a_2 \to c_1$ ✗

$a_2 \to c_3$

$B \to A$?

$b_1 \to a_1$ ✗

a_2

$B \to C$?

$b_1 \to c_1$ ✗

c_2

c_3

$C \to A$?

$c_1 \to a_2$

$c_2 \to a_1$ ✓

$c_3 \to a_2$

$C \to B$?

$c_1 \to b_1$

$c_2 \to b_1$ ✓

$c_3 \to b_1$

$AB \to C$?

$a_1 b_1 \to c_2$

$a_2 b_1 \to c_1$ ✗

c_3

$AC \to B$?

$a_1 c_2 \to b_1$

$a_2 c_1 \to b_1$ ✓

$a_2 c_3 \to b_1$

$BC \to A$?

$b_1 c_2 \to a_1$

$b_1 c_1 \to a_2$ ✓

$b_1 c_3 \to a_3$

$A \to BC$?

$a_1 \to b_1 c_2$

$a_2 \to c_1$ ✗

c_3

$B \to AC$?

$b_1 \to c_2$

c_2 ✗

c_3

$C \to AB$?

$c_1 \to a_2 b_1$

$c_2 \to a_1 b_1$ ✓

$c_3 \to a_2 b_1$

$A \to B$

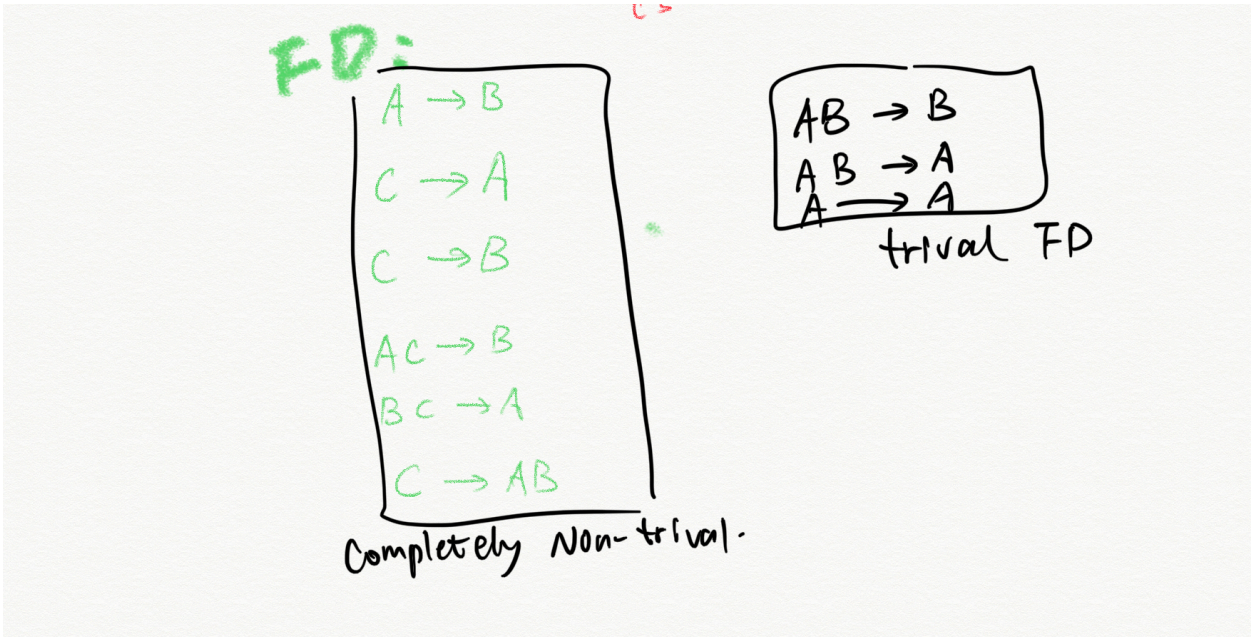
$C \to A$

$C \to B$

$AC \to B$

$BC \to A$

$C \to AB$


FD:
A → B
C → A
C → B
AC → B
BC → A
C → AB
Completely Non-trivial.
AB → B
AB → A
A → A
trival FD

Hw4 q3 tp be done

#3. Student.
Class.

Take(sid, dept. cnum)

(a). One-to-One. relationship exists between.
Student. and class

sid → dept, cnum.
dept, cnum → sid

(b). many-to-one relationship exists between.
Student. and class.

sid → dept, cnum.

#4 FD: $A \to BC$. $CD \to E$ $B \to D$ $E \to A$

a): Is A a key for R? $A \to R$?

Logical implication.

I use canonical database to solve it:

Yes. $A \to R(A\,B\,C\,D\,E)$

R	A	B	C	D	E
u_1	a_1	b_1	c_1	d_1	E_1
u_2	a_1	b_1	c_1	d_1	E_1

b_1 c_1 d_1 E_1 ?

b) Is BC a key for R?

$BC \to R$?

R	A	B	C	D	E
u_1	a_1	b_1	c_1	d_1	E_1
u_2	a_1	b_1	c_1	d_1	e_1

Yes. $BC \to R(A\,B\,C\,D\,E)$

a_1 d_1 E_1 ?

FD: $A \to BC$. $CD \to E$ $B \to D$ $E \to A$

Hw4 q5

Assume FD hold for $R(A, B, C, D, E, F)$

FD: $A \to BC$,
$C \to E$
$B \to D$.

Is R is BCNF?

R is in BCNF iff. X contains a key. for every $(X \to Y) \in FD$.

Answer: FDs are:

$A \to BC$ A contain a key?

$C \to E$ C contain a key?

$B \to D$ B contain a key?

$\{A\}^+ = \{ABC\}$
$\{A\}^+ = \{ABCDE\}$
} A doesn't contain a key.

$\{B\}^+ = \{BD\}$. } B doesn't contain a key.

$\{C\}^+ = \{CE\}$ } C doesn't contain a key.

BCNF Decomposition Algorithm

Decompose R into R1 (X+) and R2 (X, Z)

X is the common attribute

Z is all attr except X+

Step 1: $A \rightarrow BC$.

$\{A\}^+ = \{ABCDE\}$

R1 (A B C D E) R2 (A F)

Step 2: $C \rightarrow E$

$\{C\}^+ = \{CE\}$

R3 (C E) R4 (C, A B D F)

R4 (A, B, C, D, F)

Step 3: $B \rightarrow D$

$\{B\}^+ = \{BD\}$

$R_5(B.D)$ $R_6(A.B.C, E, F)$

Hw4 q6 to be done

(a) CHECK. (weight > 0 kg AND weight <= 5 kg)

(b) CREATE TRIGGER
BEFORE INSERT on Laptop.
UPDATE Laptop SET weight = NULL.
WHEN: weight > 5 OR weight < 0

Hw4 q8

#8:

A	B
1	0
1	9
100	0