

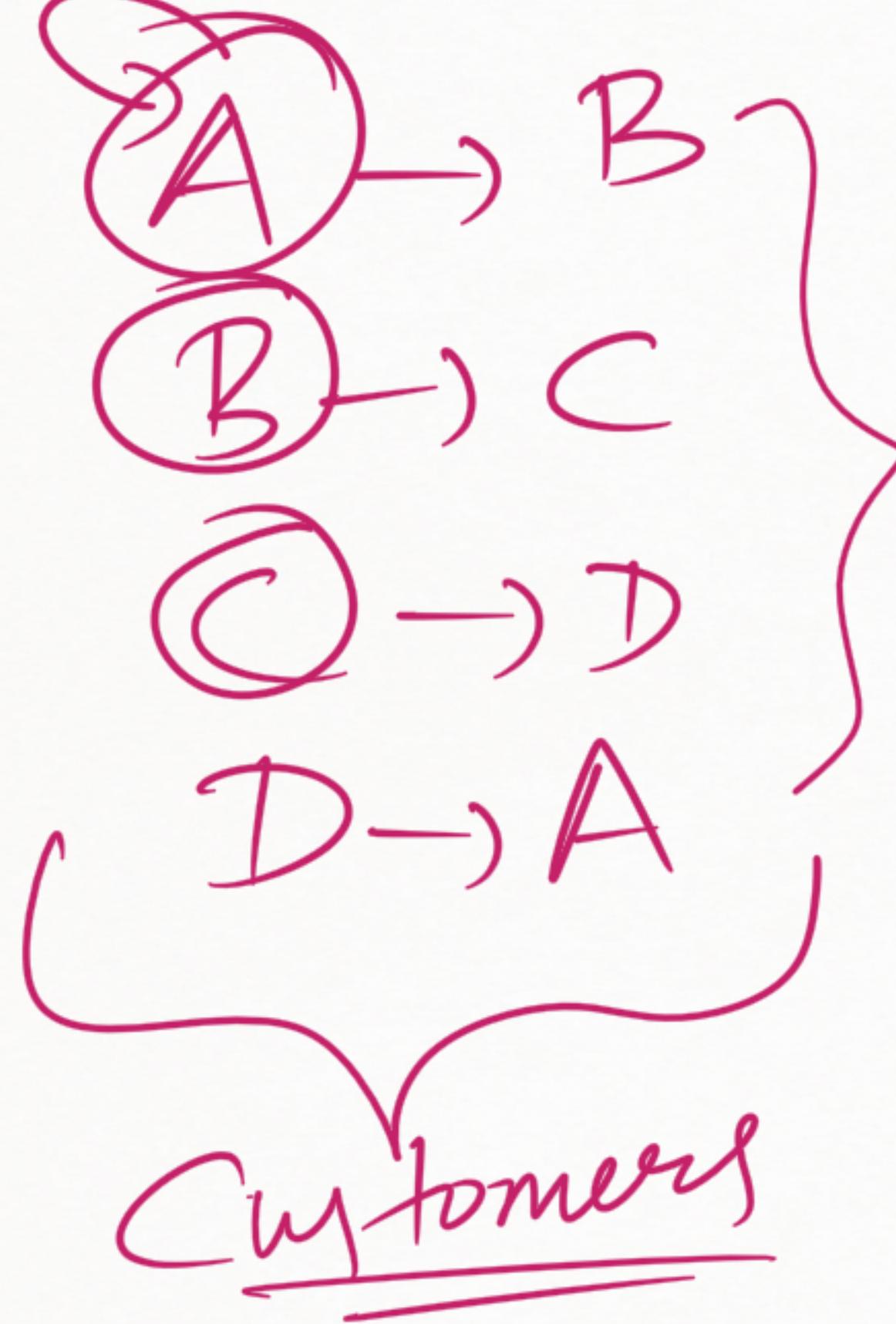
#FDs?

Only
Data

	A	B
a	a	1 2 3 4
b	b	

- ① $A \rightarrow B$ ✗
- ② $B \rightarrow A$ ✓
- Unique.

$R(A B C D)$



A	B	C	D

CK

A^+

CK

B^+

CK

C^+

CK

D^+

$\{A, B, C, D\}$

$\{B, C, D, A\}$

$\{C, D, A, B\}$

$\{D, A, B, C\}$

~~$A^+ B^+ C^+ D^+$~~

~~Minimal~~

~~S.K.~~

$R(\underline{AB}\underline{CD})$

$$B^+ = B \quad C^+ = C, \quad D^+ = DA$$

$$\underline{BC}^+ = BC, \quad \underline{CD}^+ = CDA$$

$$A^+ = A$$

$\circlearrowleft AB^+$
 C_k

AB, C, D

$AB \rightarrow CD, D \rightarrow A$

$$\begin{array}{c} AC \\ \cancel{A} \cancel{D} = AD \end{array}$$

$\circlearrowleft BD$
 C_k

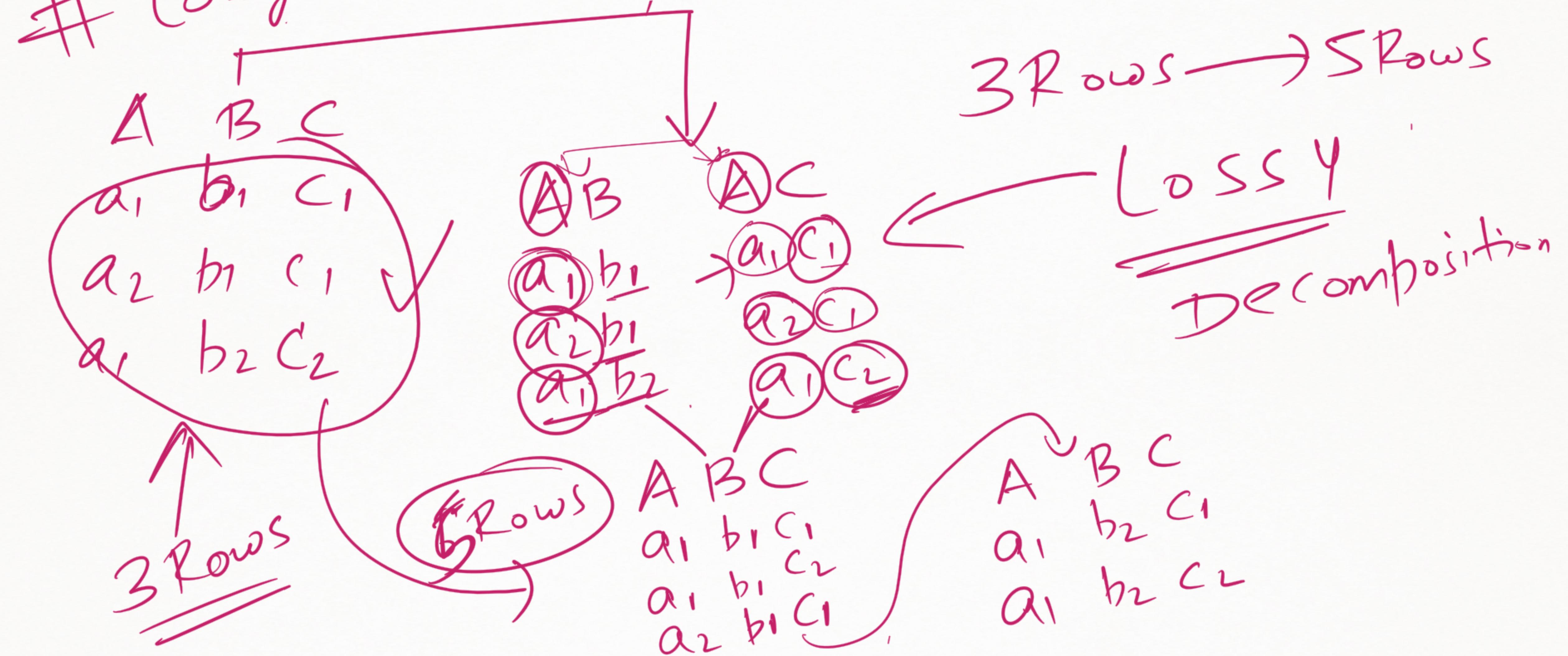
$\circlearrowleft BDAC$

B length C_k

$\circlearrowleft BDAX$

$\circlearrowleft ADC$
 $AC - \cancel{E}^{DX}$
 $BC - \begin{cases} DX \\ AX \end{cases}$

Lossy Decomposition



Lossless Decomposition

A	B	C
a ₁	b ₁	c ₁
a ₂	b ₁	c ₁
a ₁	b ₂	c ₂

3 Rows

B → C



A	B	C
a ₁	b ₁	c ₁
a ₂	b ₁	c ₁
a ₁	b ₂	c ₂

3 Rows

* Common Attrib
b/w tables should
be a C_K in
any one of the
broken Table

1st Normal Form

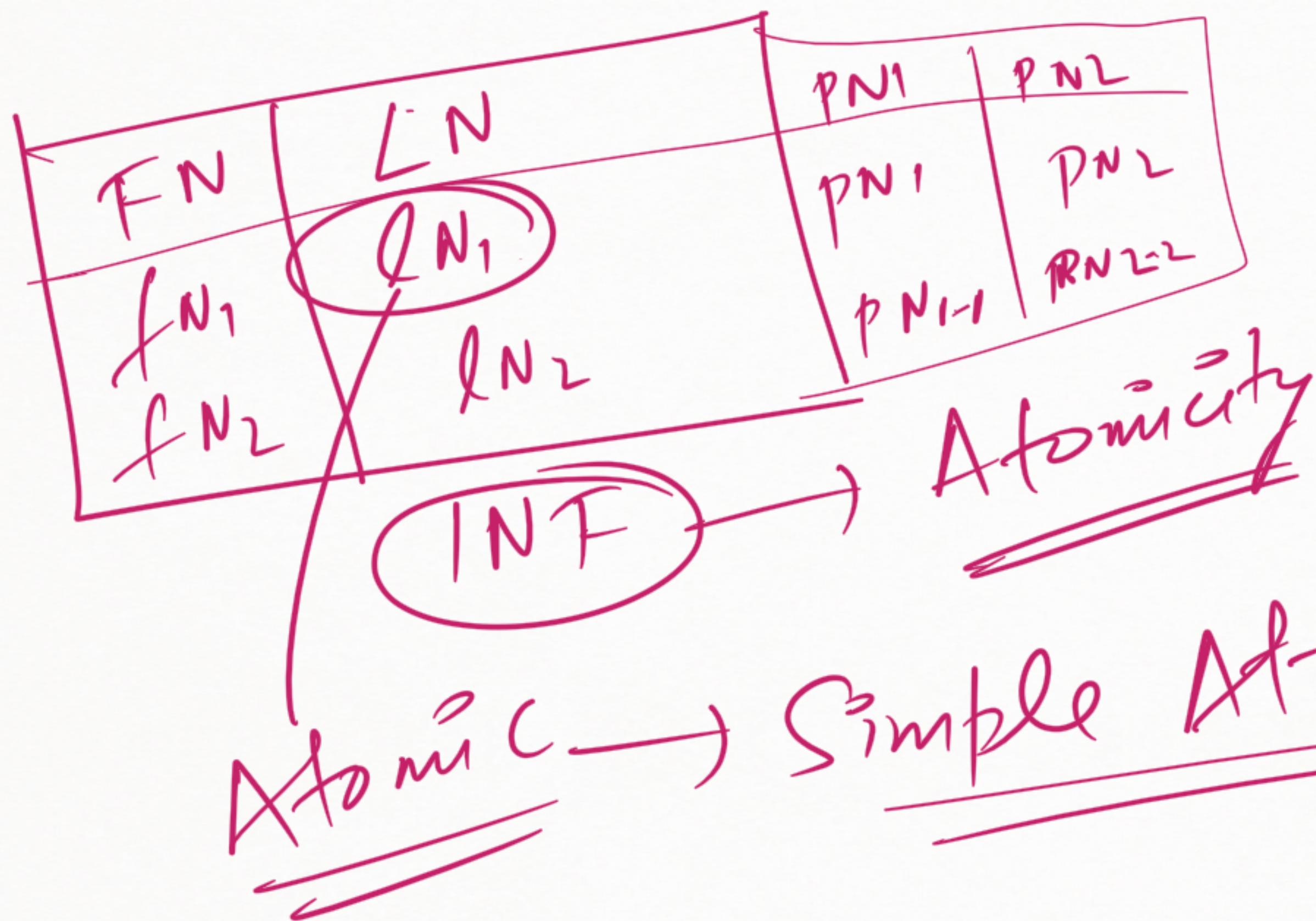
Multivalued Attributes

Composite Attributes



Name	Phone No
FN, LN	PN1, PN2

Not in a INF
Atomicity



2nd Normal Form

→ INF

→ ~~Partial Dependency.~~

	A	B	C
1	a	$\text{B} \rightarrow C$	$C = C$
2	a	$\text{B} \rightarrow C$	$C^+ = C$
1	b	$\text{A}^+ = AB$	$C^+ = C$
2	b	$B^+ = BC$	$C^+ = C$
1	c	$AB^+ = ABC$	$C^+ = C$
2	c	$AC^+ = AC$	$C^+ = C$
3	c	$BC^+ = BC$	$C^+ = C$

Part of the CK is determining something.



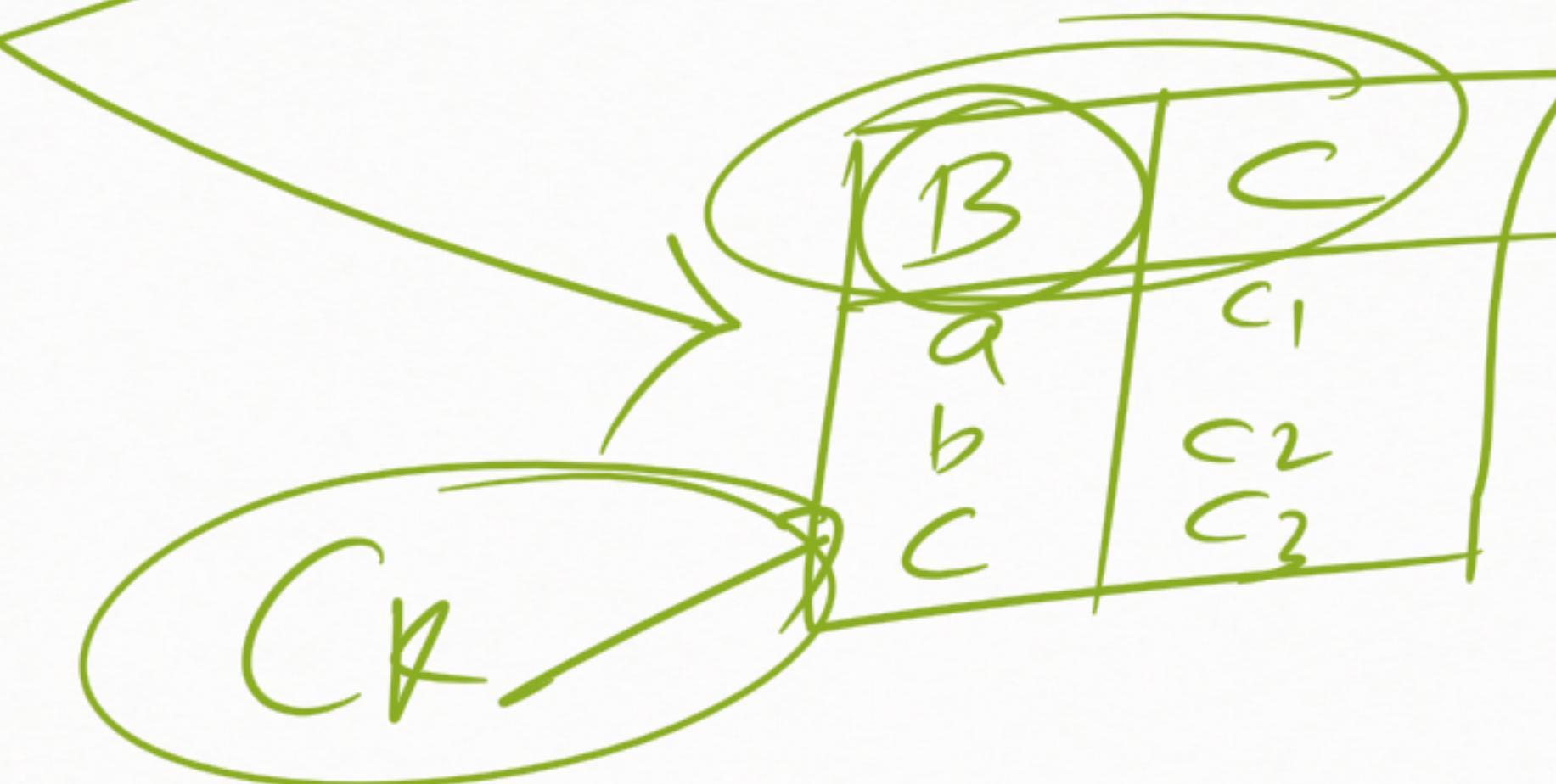
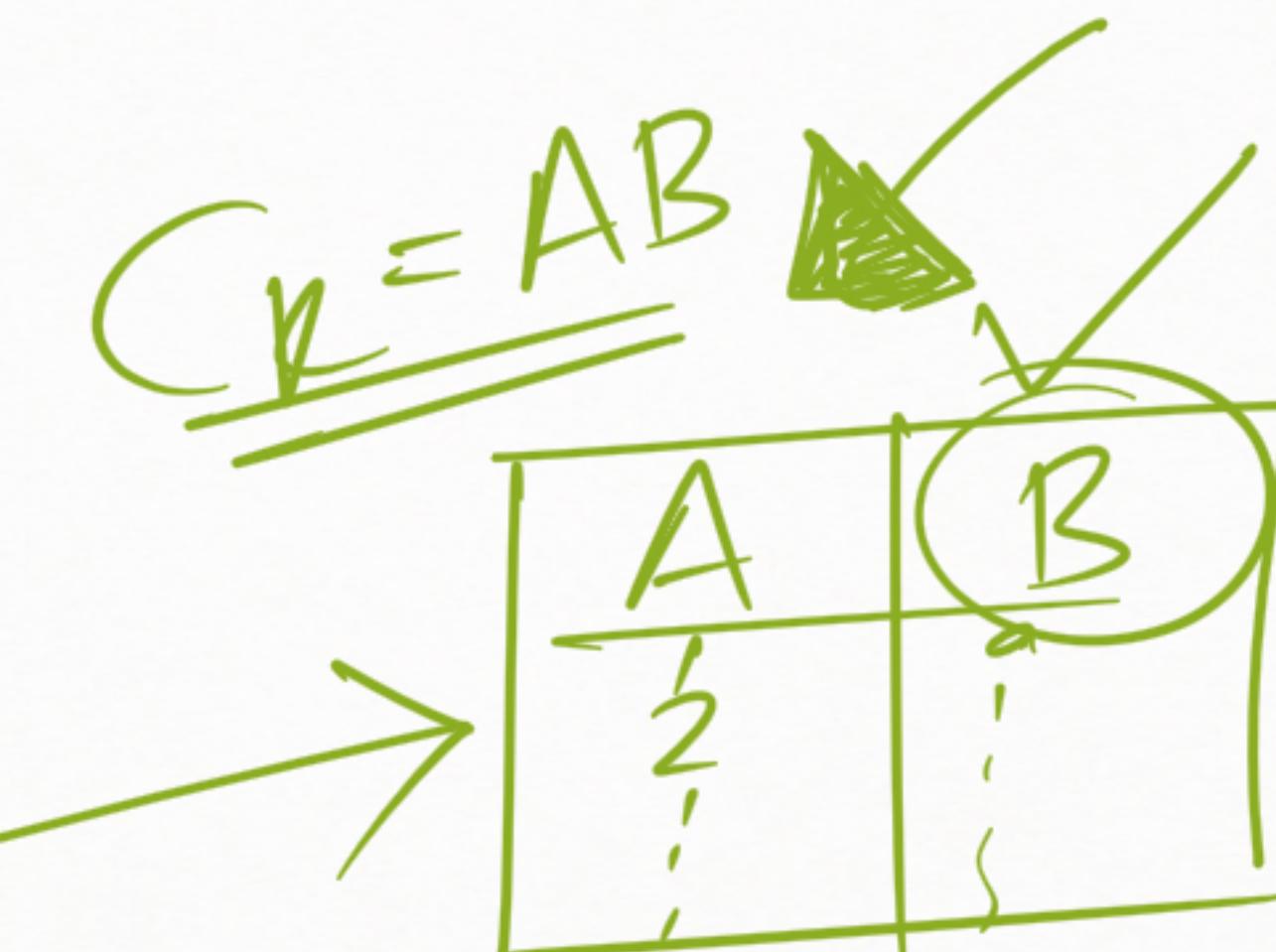
~~2NF~~

Prime Att - (A, B)

Any Prime Att on left h.s of FD

~~2NF~~

How to make it in 2NF



✓ LOSSLESS
DECOMP
POSITION

$R(ABCD)$

F.D = $\{\underline{AB} \rightarrow C, \underline{B} \rightarrow D\}$

$C_k = AB$

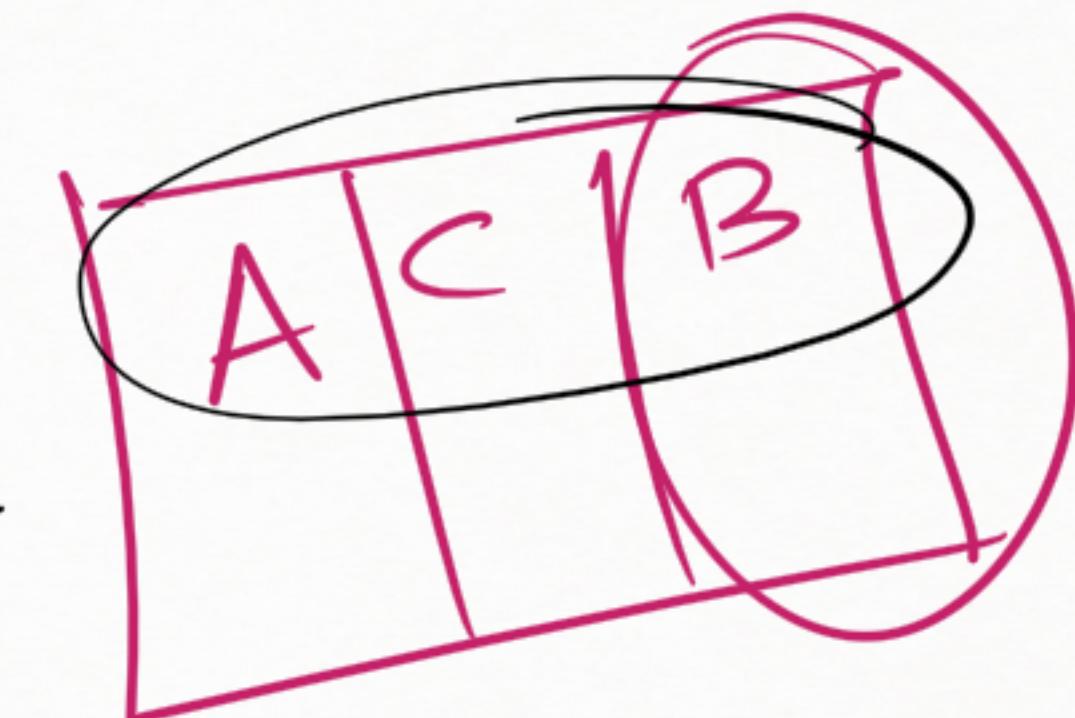
P.D?

B^+

$B \rightarrow D$

$AB \not\rightarrow \emptyset$

$\times 2^{NF}$



$ABC \not\rightarrow \emptyset$

C_k



(ossless

$R(ABCDEF(GHI))$ $\Sigma_k = ABD$

$AB \rightarrow C$

$BD \rightarrow EF$

$AD \rightarrow GH$

$A \rightarrow I$

$H \rightarrow J$

PD

$$AB^+ = \textcircled{ABC}I \quad CK$$

$$BD^+ = \textcircled{BDEF} \quad CK$$

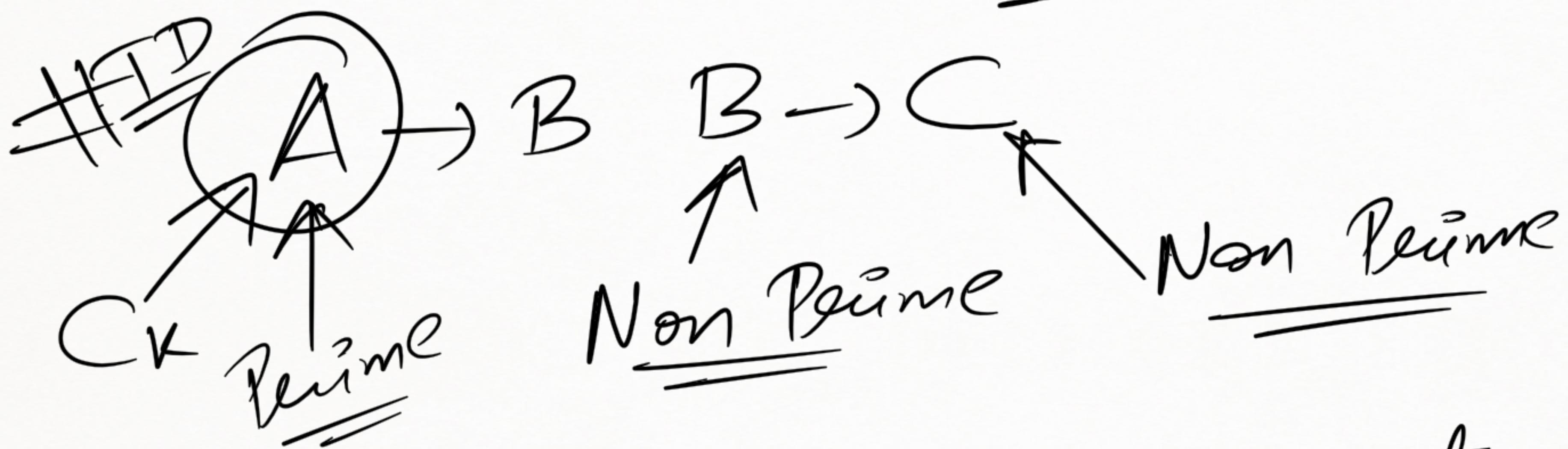
$$AD^+ = \textcircled{AD} \textcircled{GHIJ} \quad PD$$

$$A^+ = \textcircled{AI}$$

CK

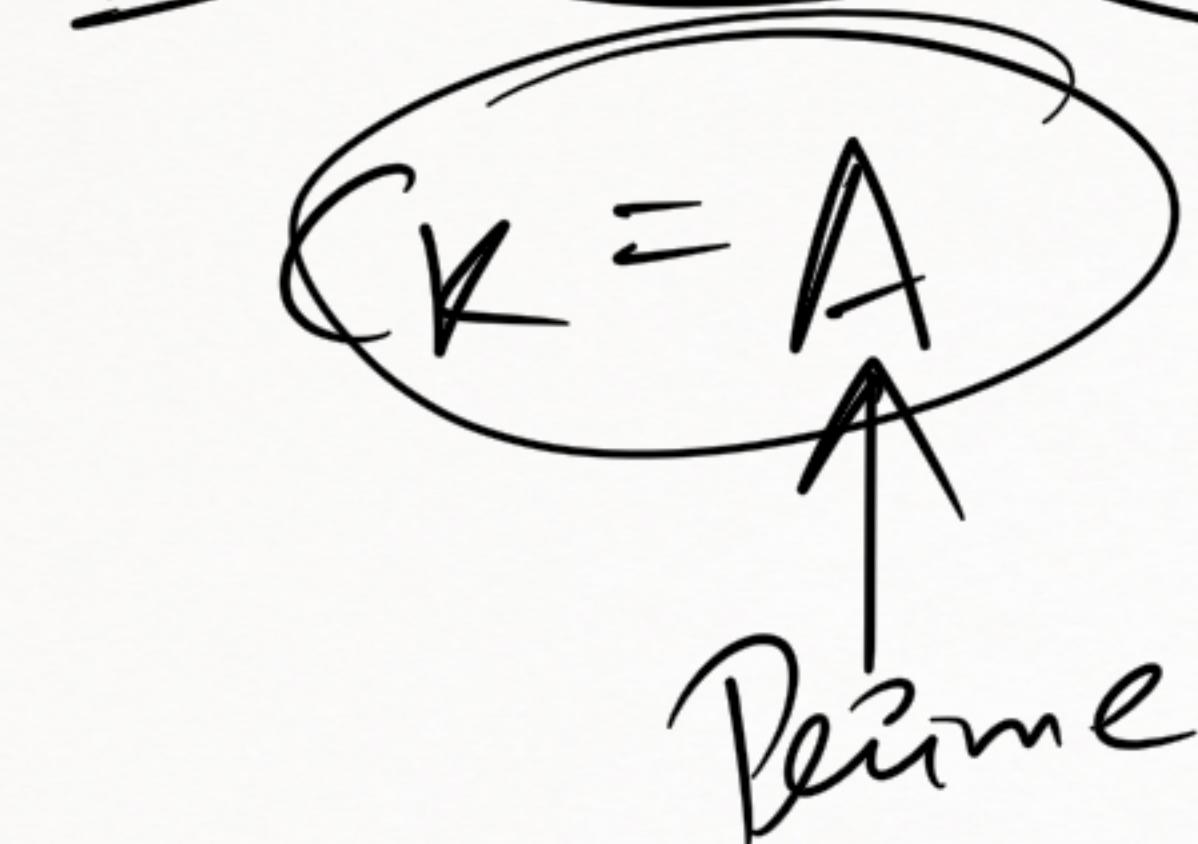
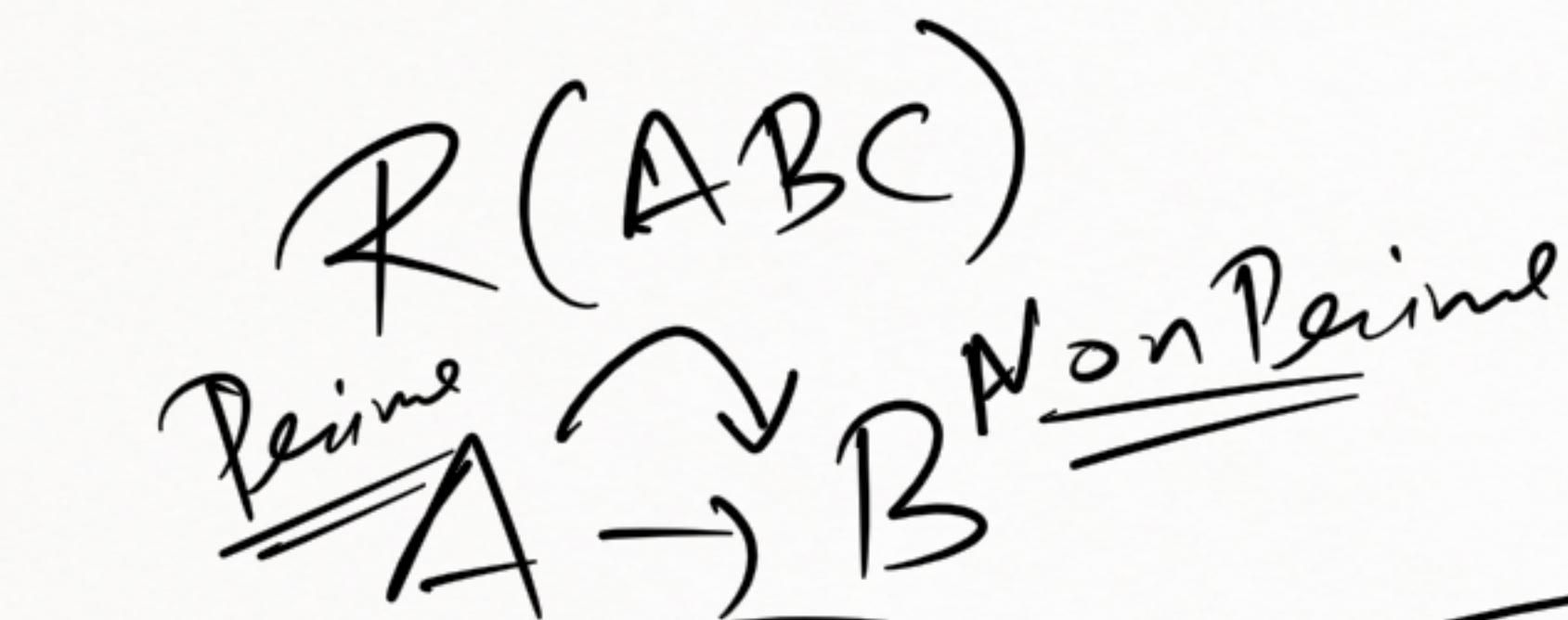
Lossless
Decomp

3NF $\xrightarrow{2NF \checkmark}$
 \hookrightarrow No TD (Transitive Dependency)



If TD exist Table will not be in 3NF

Transitive Dependence.



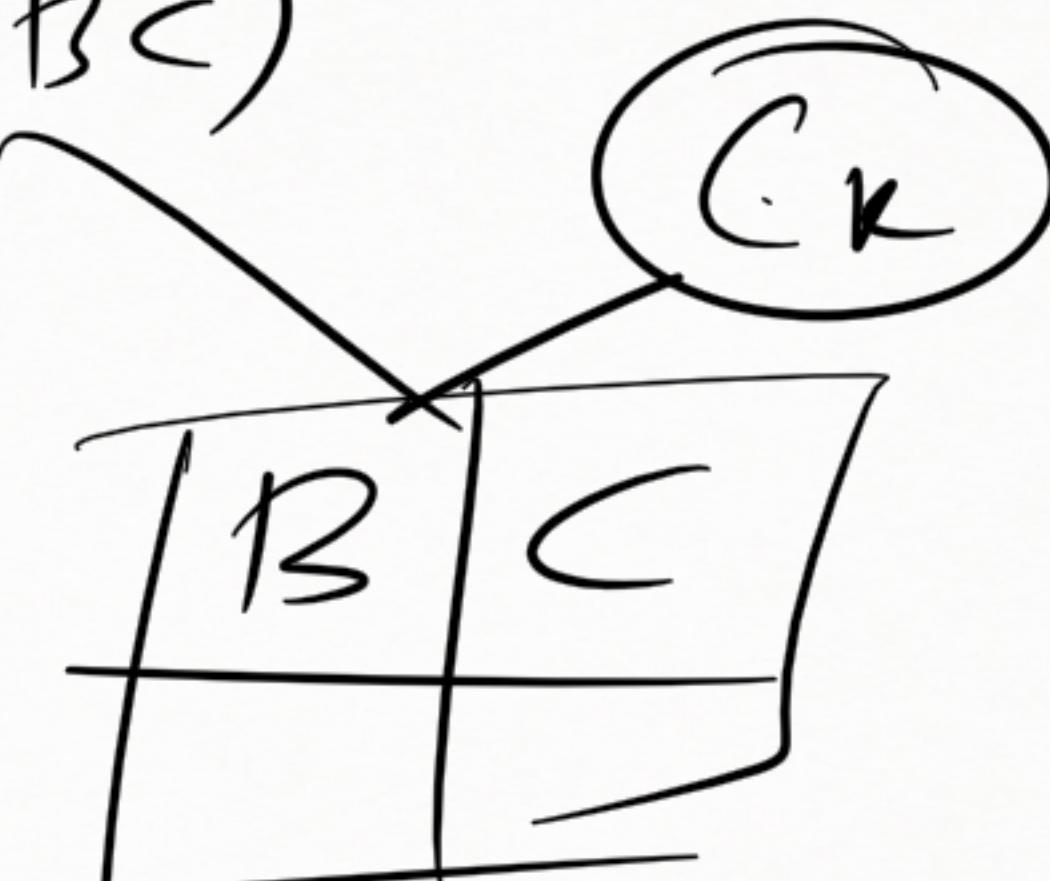
T.D (X3NF)

How do we convert?

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

$R(ABC)$

A	B

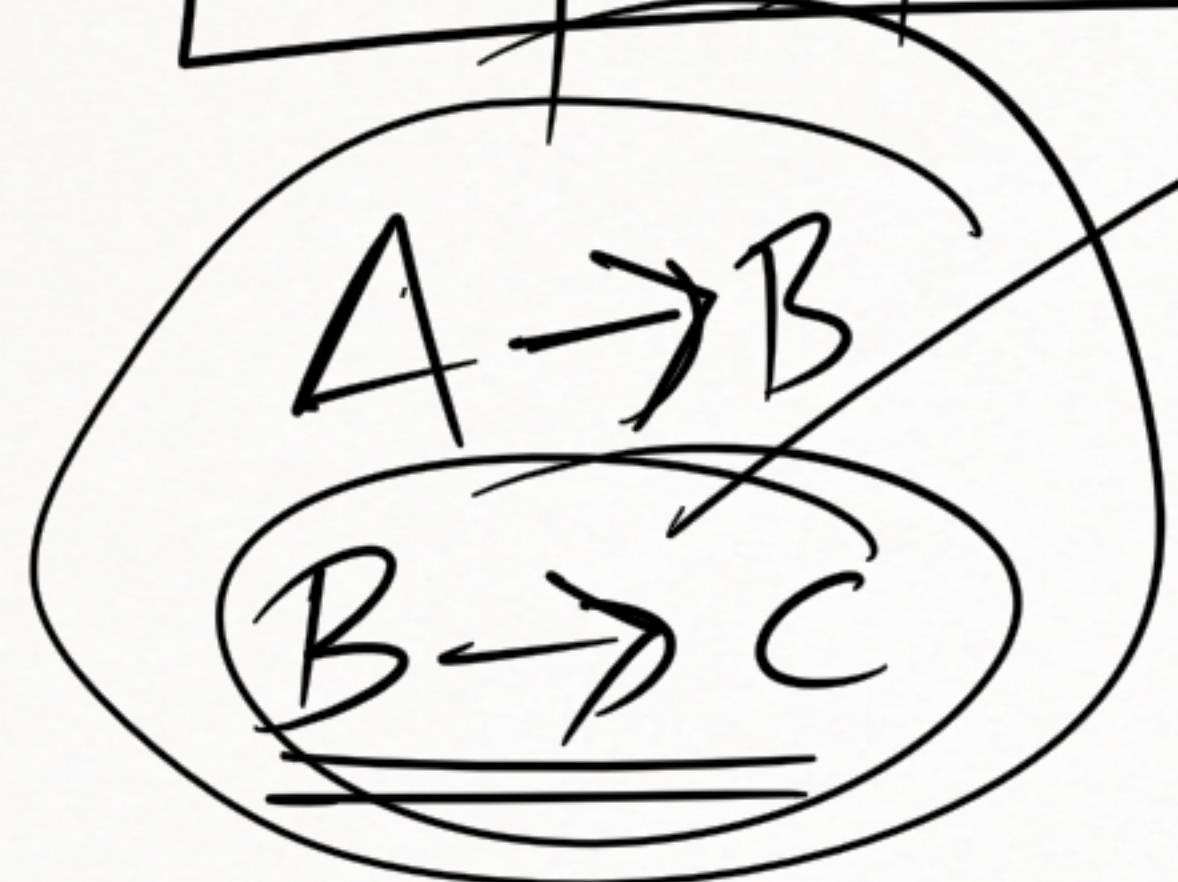


	A	B	C
1	a		c_1
2	a	a	c_1
3	a	a	c_1
4	a	a	c_1
5	b	b	c_2
6	b	b	c_2

Redundancy

$$B^+ = BC$$

$$ABC$$



A	B	C
1	a	
2	a	a
3	a	a
4	b	
5	b	

C	B	A
1		a
2		b
3		a
4		c ₂

Lossless

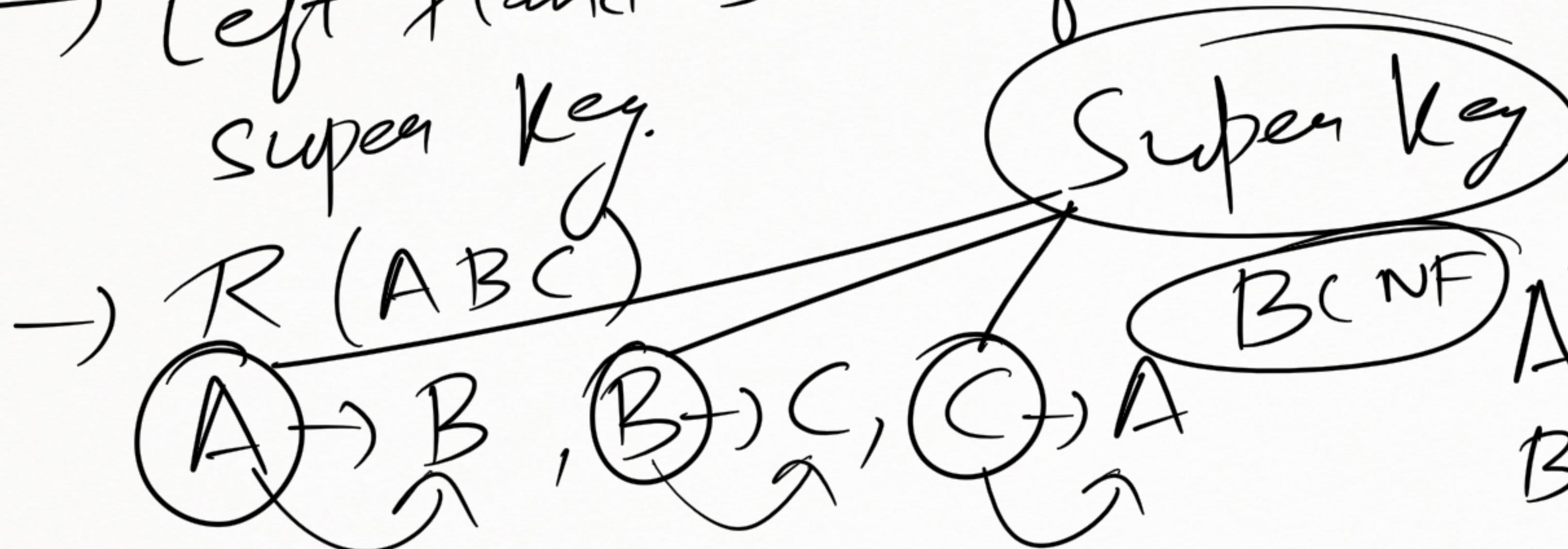
$$B^+ = BC$$

BCNF \rightarrow Best 0% Redundancy

\rightarrow Whenever a Non Trivial FD $X \rightarrow A$,

\rightarrow Then X should be a super key.

\rightarrow Some left Hand Side of all FD must be a super key.



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

$R(ABC)$

FD =

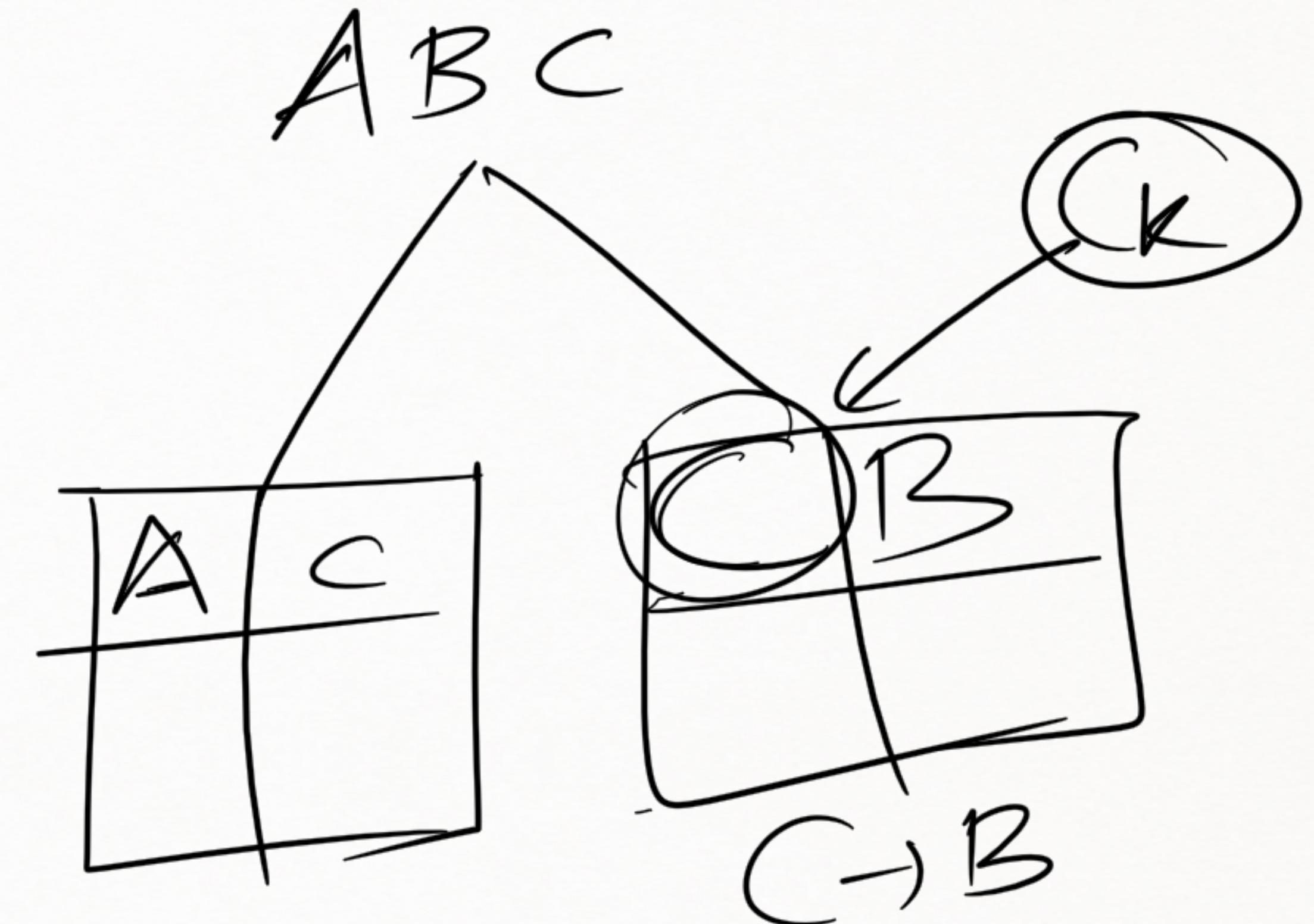


Super Key.

$$AB^+ = ABC \quad \checkmark$$

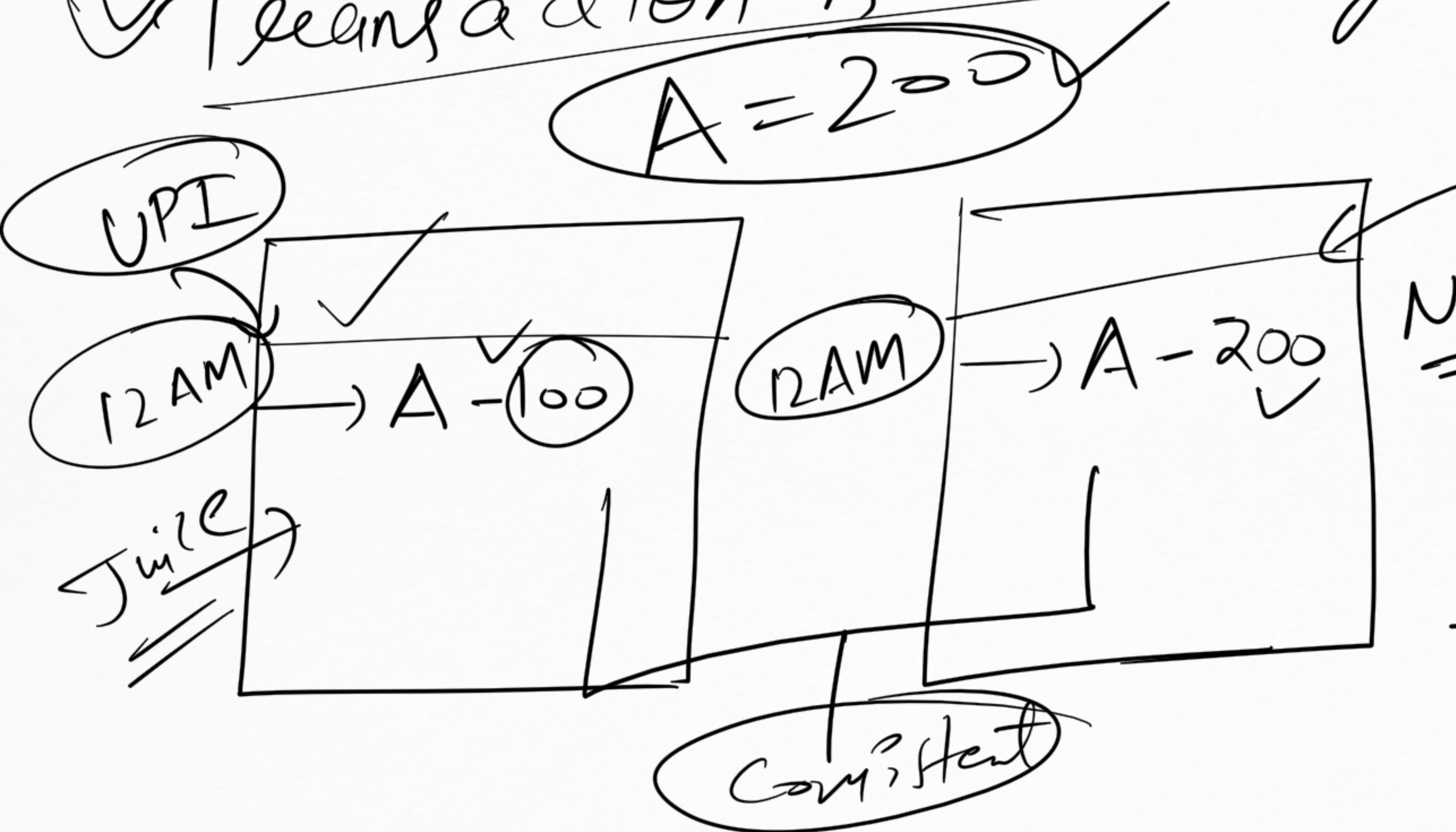
~~$$CC^+ = B$$~~

~~$$XBCNF$$~~



it's ok
to loose
while
Normalising
lossless

Transaction & Concurrency Control



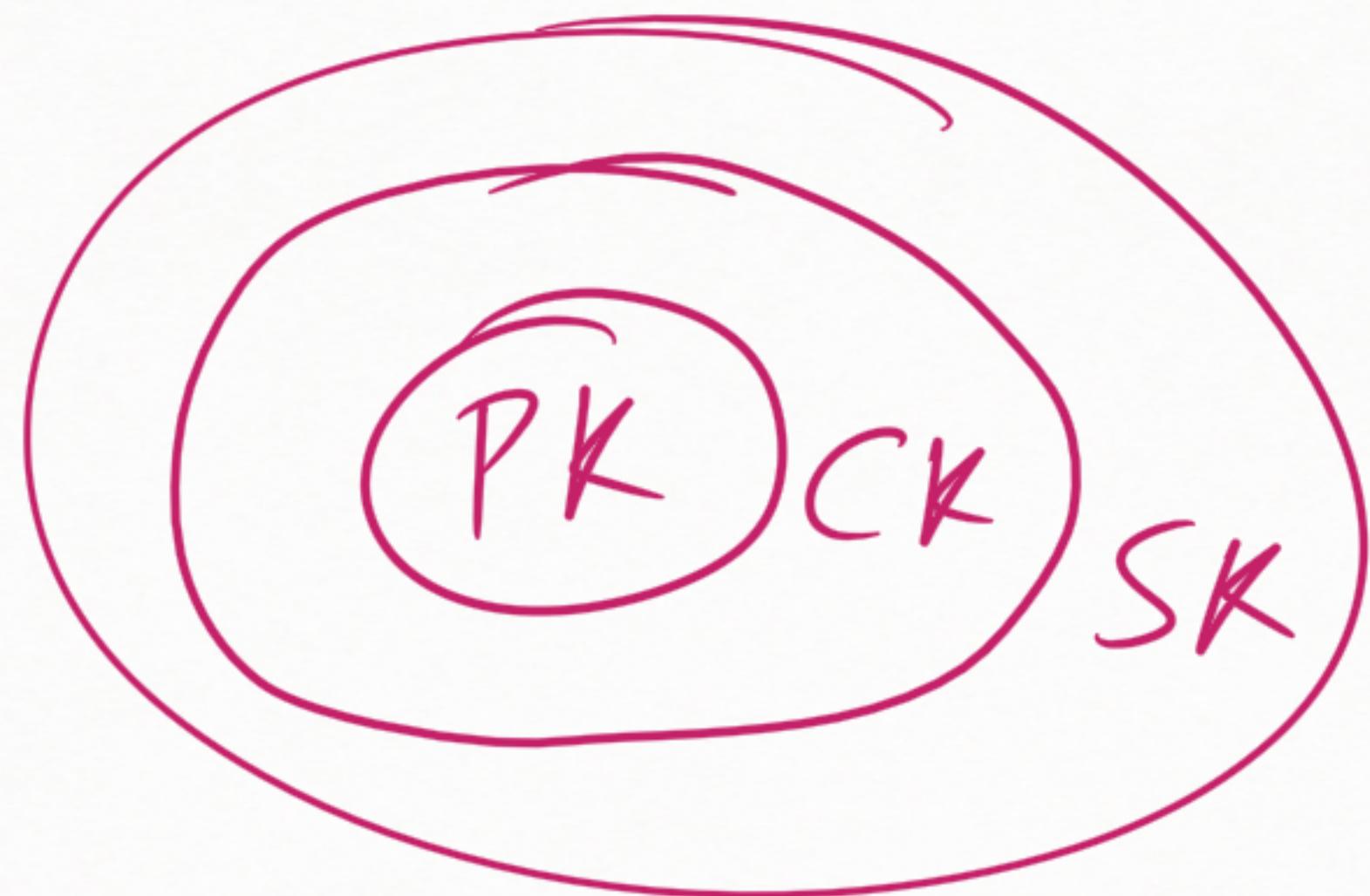
Netflix
→ Transaction

Passbooks
→ Transaction

Interview

① 2nd Highest Salary in Emp. Table

② Candidate Key Vs Super Key Vs Primary Key



$$\underline{\underline{SK}} = CK + \text{Waste}$$

PK \rightarrow one of
CK

③ Why do we need PRIMARY KEY

④ Diff b/w SQL & NOSQL

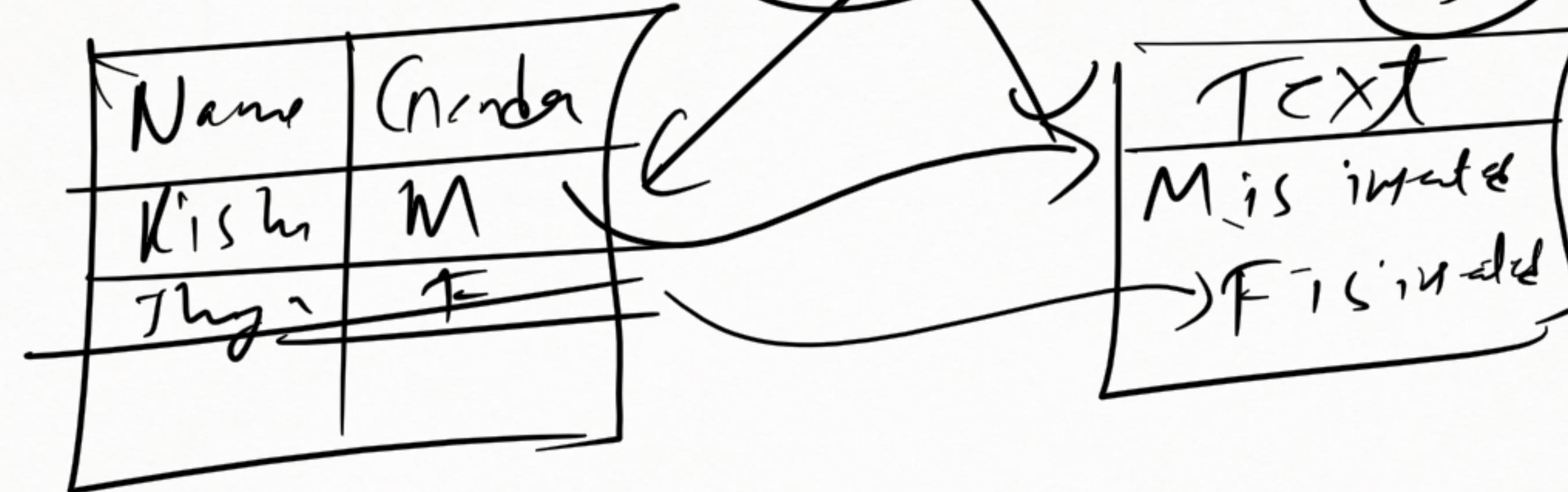
⑤ SQL Queries

Subquery / Nested
Only
Correlated Subquery

⑥ Max Salary of Department

⑦ Left Join, Right Join, Join

* Triggered Early Rules



⑧ ER Diagram

Edit, Attr

⑨ One to One

Vs

One to Many

Vs

Many Vs Many

⑩ Why Need Normalization