

## Normalization

Breaking down of table along the columns by following some rules.

A	B	C	D	E
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Table 1

A	B
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Table 1.1

B	C	D	E
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Table 1.2

# # Why do we Need Normalization

~~Millions~~

EmplID	EName	Dcp ID	Dcp Num	Supervid	Group
101	Ashish	A	CS	Null	X
102	Khal	B	IT	101	Y
103	Deepak	A	CS	101	Z
104	Srip	B	IT	102	a
105	Suhil	A	CS	102	b

Dcp ID	Dcp Num
A	IT
B	CS

① Redundancy  $\Rightarrow$  Repeated Data

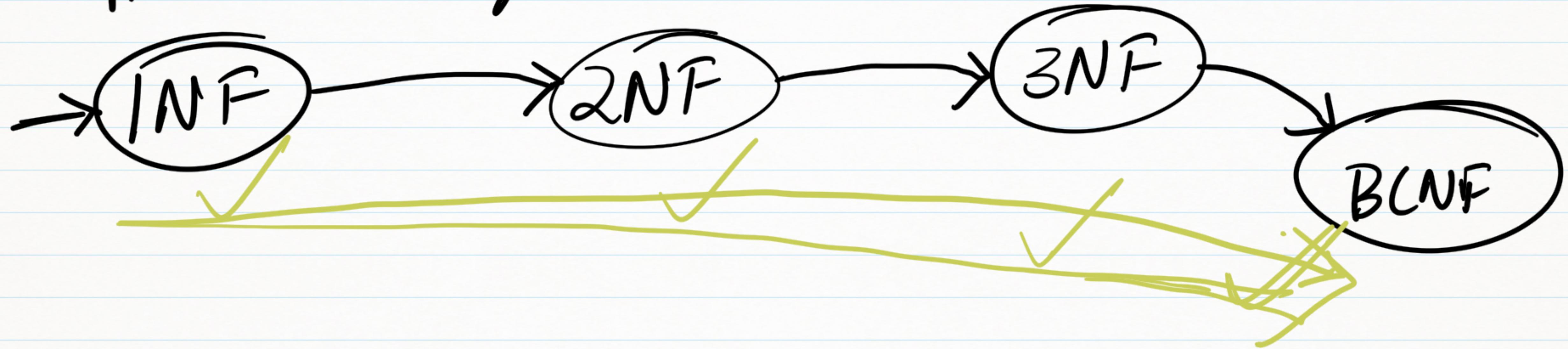
② Anomalies

① Insertion  $\rightarrow$  Insert a ~~New emp~~

② Deletion  $\rightarrow$  When I delete all emps  
of dcp = A

③ Update  $\rightarrow$  CS  $\Rightarrow$  Compu

# # Normalization Forms



# # Functional Dependency

X	A	B	C
m	1	a	b
n	2	a	c
o	3	d	e
p	4	f	g

$$A \rightarrow BC$$

A determines BC

Given the value of

A you will be able to identify B & C without any confusion.

A B C

1	1	4
1	2	4
2	1	3
2	2	3
2	4	3
2	5	5

FDS

$A \rightarrow B$

$C \rightarrow A$

$A \rightarrow C$

# Closure

A	B	C	D	E

FDS

$$A \rightarrow B \checkmark$$

$$B \rightarrow D$$

$$C \rightarrow D, E$$

$$CD \rightarrow AB$$

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

$$AB^+ = \{B, A, D\}$$

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

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

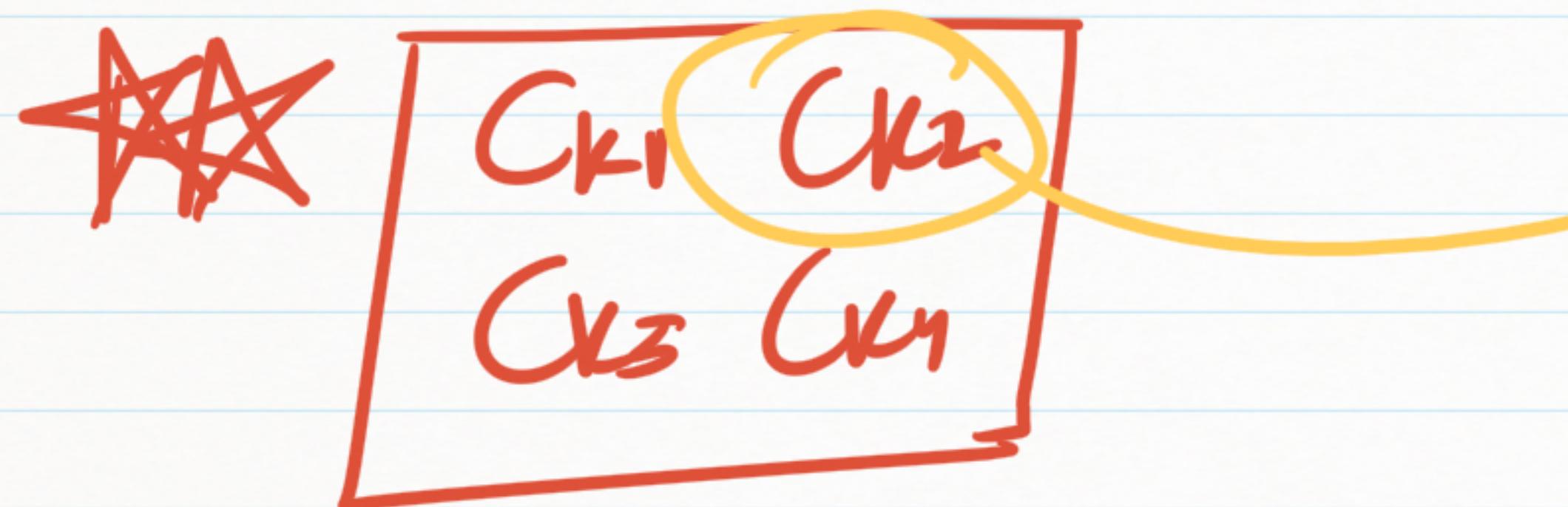
$$D^+ = \{D\}$$

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

## Candidate Key

Given an attribute or a collection of attributes, we will be able to uniquely identify a row.

Minimal Set of Attributes ✓



Primary Key

Super Key

= Candidate Key + ~~Watte~~

Roll No	Name	Mark
101	John	85

Columns which  
are not  
required

# 1st Normal Form

Name	Gender	Phone.
A	M	900-... 820-...
B	F	91-... 837-...

↑  
Nat in  
INF

X Atomically.

Name	Grade
A	M
B	F

✓  
INF

Name	Phal	Phal
A	900-	820-
B	91-	837-

2<sup>nd</sup> Normal Form → INF ✓  
 → X Partial Dependency  
 (\* Given) AB → C  
 (Part of C<sub>k</sub> is determining something else)

	A	B	C
1	a		C <sub>1</sub>
2	a		C <sub>1</sub>
1	b		C <sub>2</sub>
2	b		C <sub>2</sub>
1	c		C <sub>3</sub>
2	c		C <sub>3</sub>
3	c		C <sub>3</sub>
4	c		C <sub>3</sub>

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

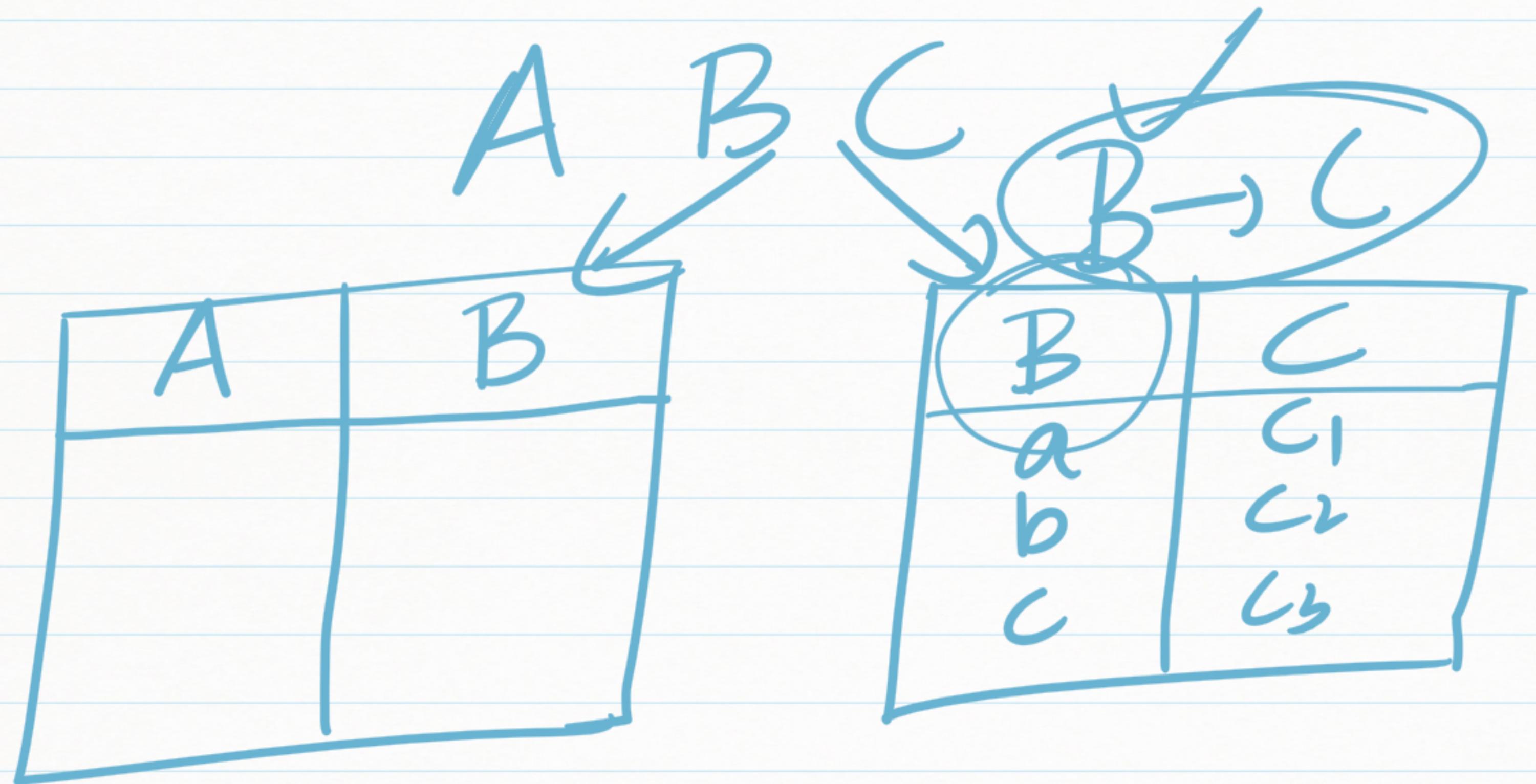
$$B^+ = \{B, C\}$$

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

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

Not in 2NF

# How to make a table in 2NF

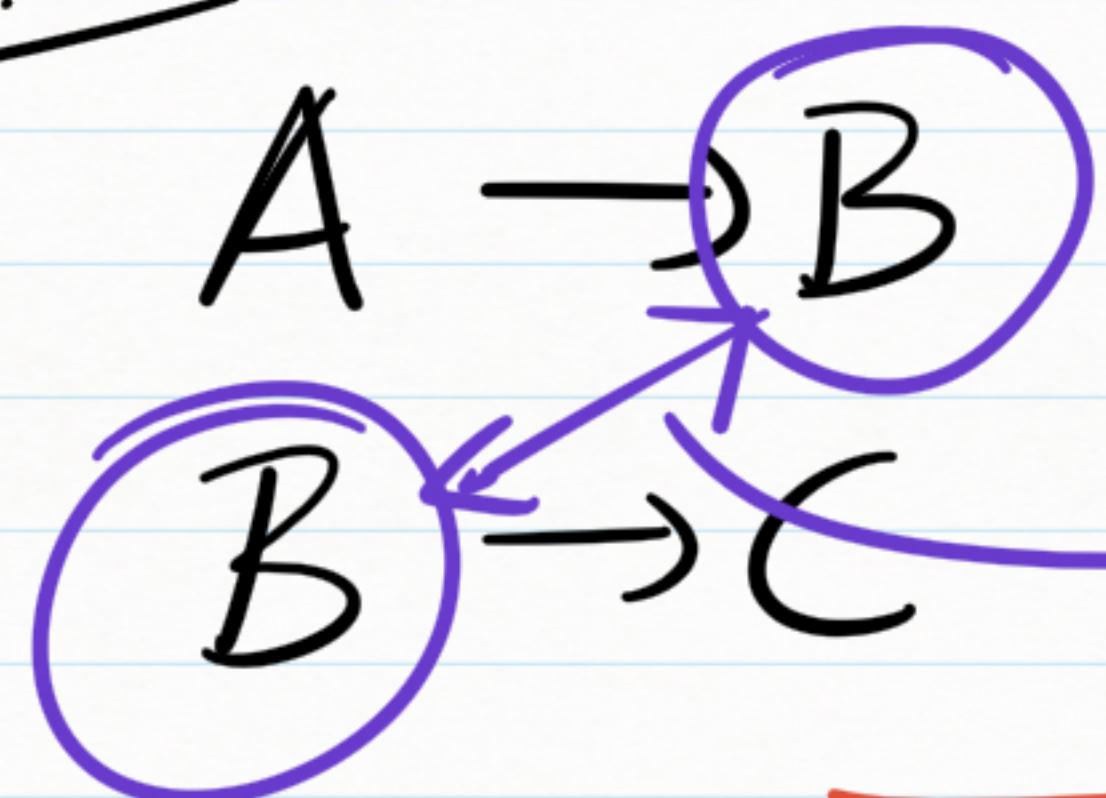


~~# 3NF~~ → 2NF ✓  
→ No Transitive Dependency.

A	B	C
1	a	$c_1$
2	b	$c_2$

a  $c_1$

E.D



Not in 3NF

Transitive  
Dependency

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

B	C
a	$c_1$
b	$c_2$

How to make it in 3NF?

	A	B	C
1	a	a	x
2	a	a	z
3	a	b	y
4	b	b	z
5	b	b	y
6	b	b	x

$A \rightarrow B$

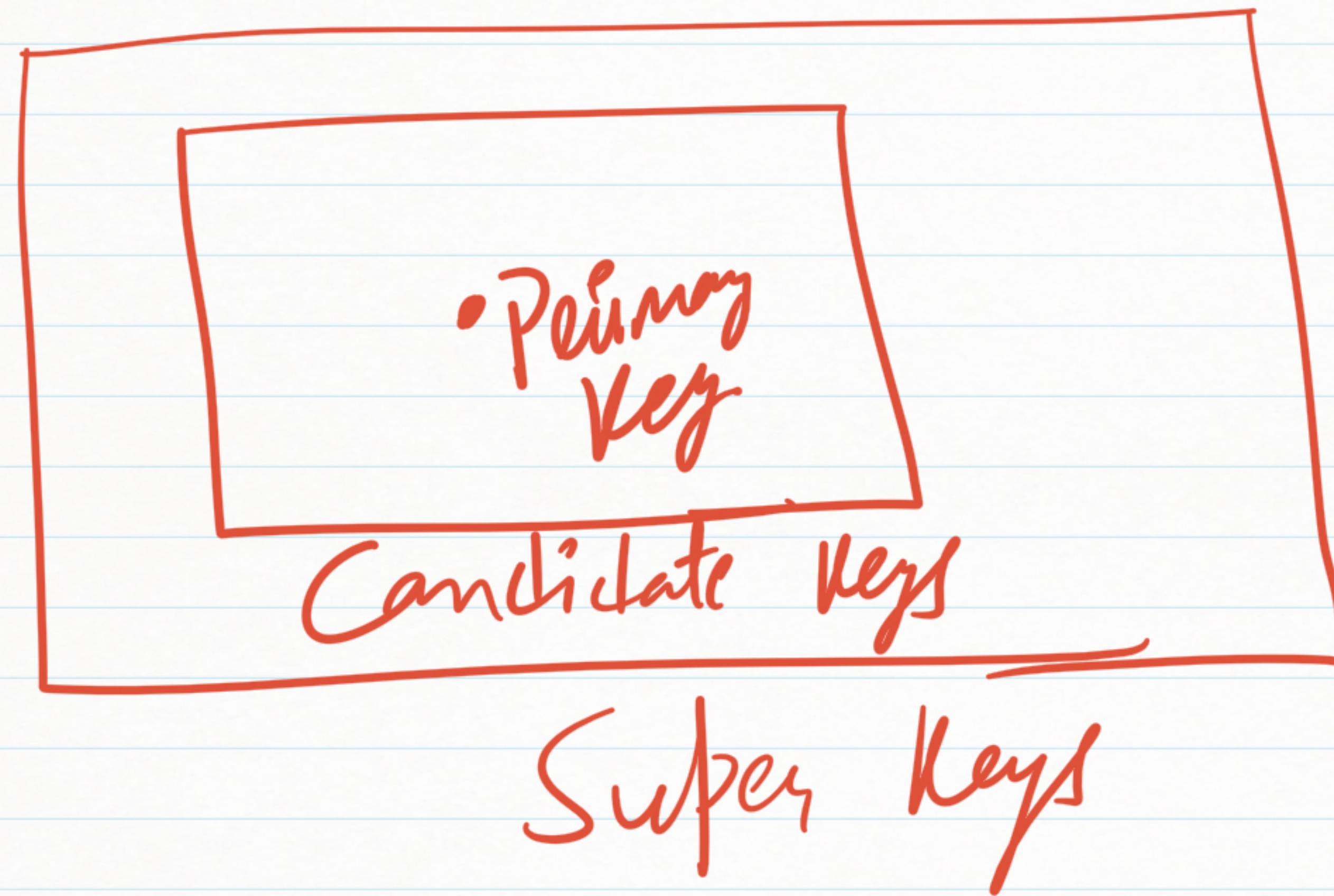
$B \rightarrow C$

A	B
a a a b b b	a a b b b b
a b b b	b b b b

B	C
a a b b	x y z x
b b b	y z y

# ~~A~~ Interview Questions

- Q1. Employee table, Salary  
2<sup>nd</sup> highest salary?
- Q2. Candidate Key Vs Super Key  
Vs Primary Key.



- ③ Why do we Need a Primary Key?
- ④ What is indexing?
- ⑤ Max Salary of a Dept?

⑥ Lefts Vs Right Vs Inner Joins

⑦ ER Diagrams

⑧ Why do we need  
Normalization.

⑨ F.D, P.D - --