Super Key: ✓

Set of attributes that can differentiate records uniquely. ~~Key~~

Super key may be minimal attribute set & may not be minimal attribute set.

A ✓	B ✓	C
a	b	
a	c	
a	b	x
b	c	
c	d	
x b	c	

need

$AB = SK.$

ABC → SK.

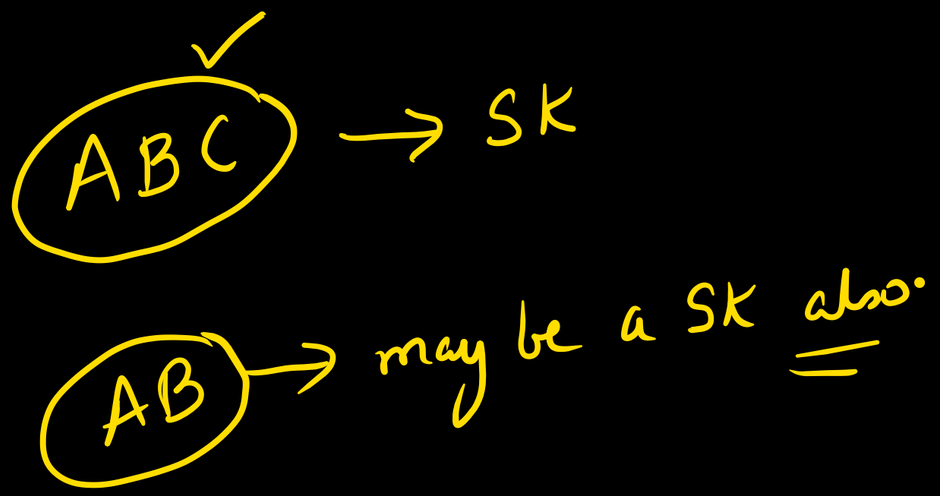
any superset will be SK

... ABCD ABCDE ABCDEF ....

minimal.

CK → AB

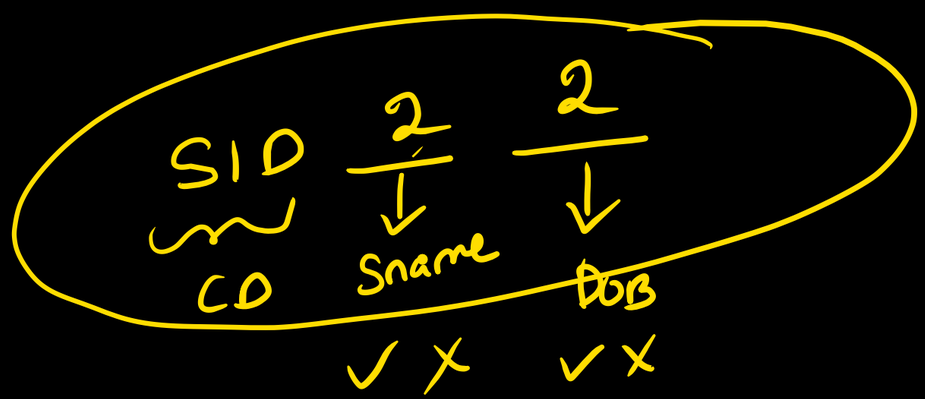
also SK.


ABC
SK
AB
may be a SK also.

Ex: Student (Sid, Sname, DOB)

Candidate key = SID

Super keys of above table = { SID, Sid Sname, Sid DOB, Sid Sname DOB }.

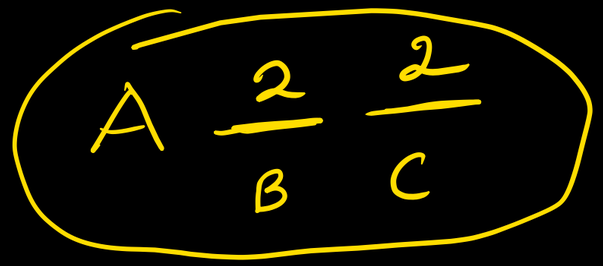


= 4 SKeys.

Table (A, B, C).

Candidate Key = A.

any superset of CK is a SK.



$\therefore$ Sk = 2×2 = 4.

SK.

attributes

no two rows should have same values in those attributes

SK → unique value in those attributes

CK → minimal SK. Primary Key → one of the CKs

SK = { AB, AC, AD, B }

CK → minimal → not minimum

SK = { A(B)CD }

also (ACD) is SK.

↓

minimal.

SK → unique

↓

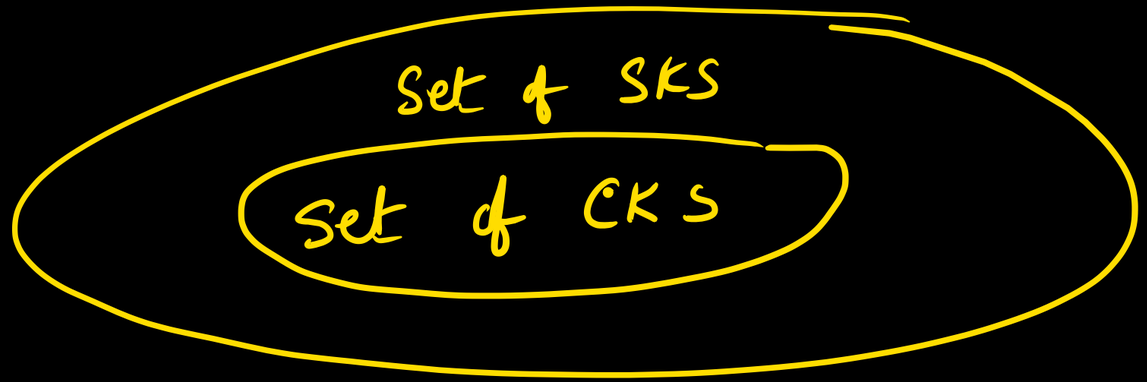
CK → minimal SK

↓

PK → one of CK's

↓

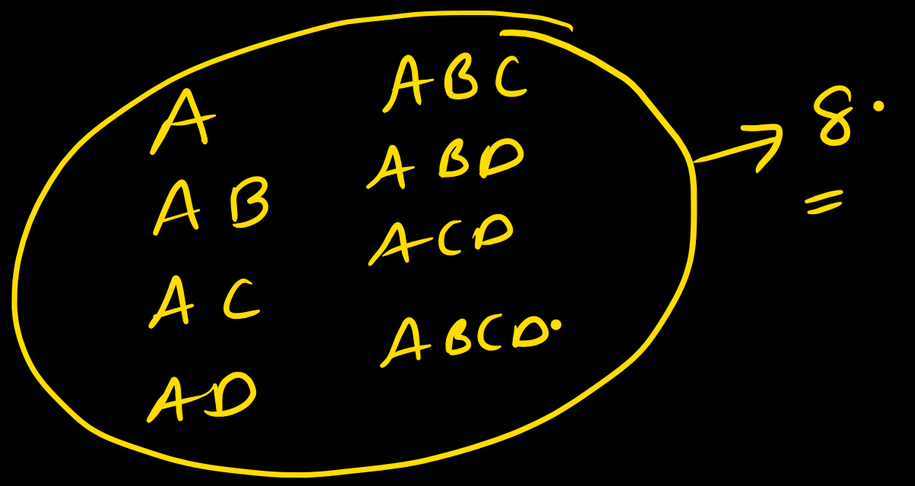
Alternate K → other than PK.



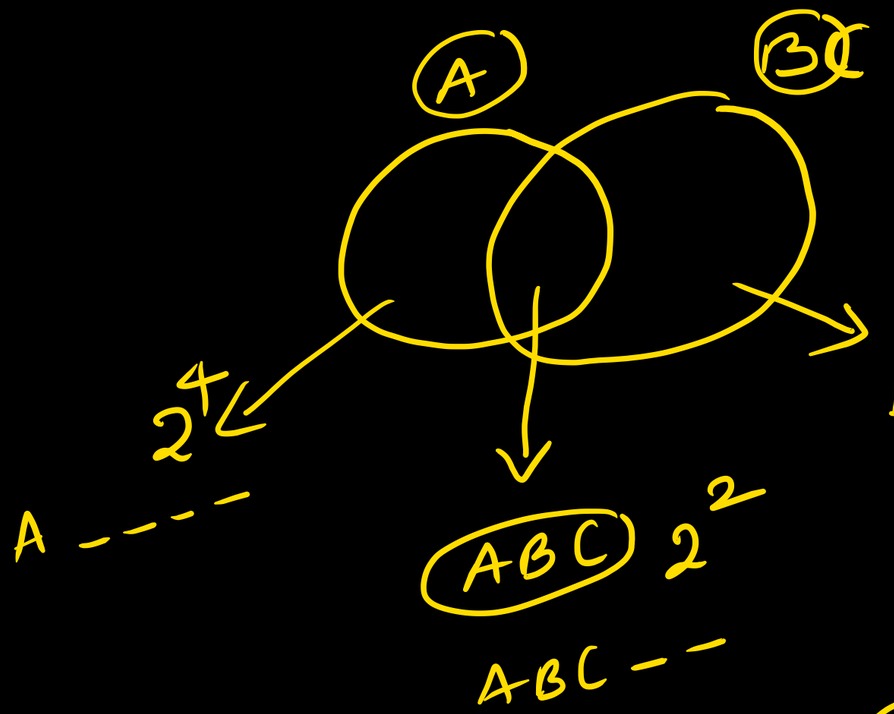
$$Sks \supseteq cks$$

How many SK are possible if R(ABCD) and Candidate Key = {A}

$$A\ \frac{2\times2\times2}{B\ C\ D} = 8.$$

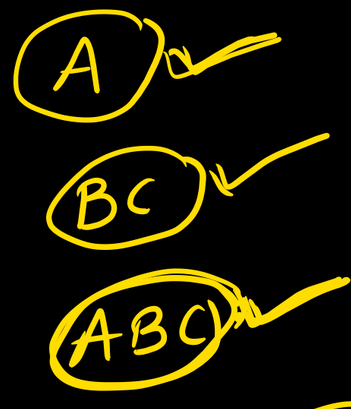


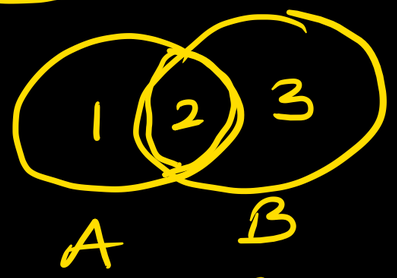
How many SK are possible if $R(A, B, C, D, E)$ and $CK = (\underline{A}, \underline{BC})$



$n(X \cup Y) = n(X) \cup n(Y) - n(X \cap Y)$

$= 2^4 + 2^3 - 2^2 = 20$ Super keys





$A \cup B$

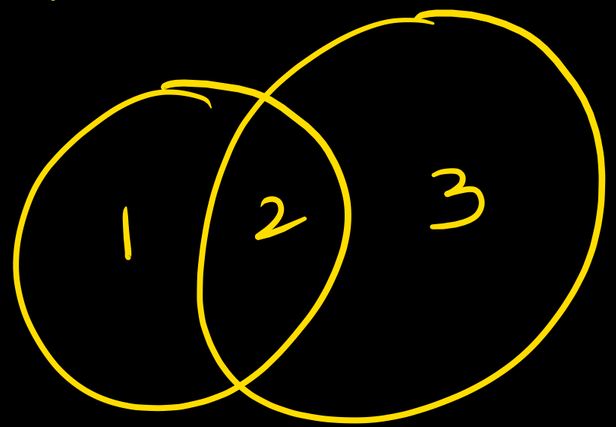
$A + B$

$1 + 2 \quad 2 + 3$

-2

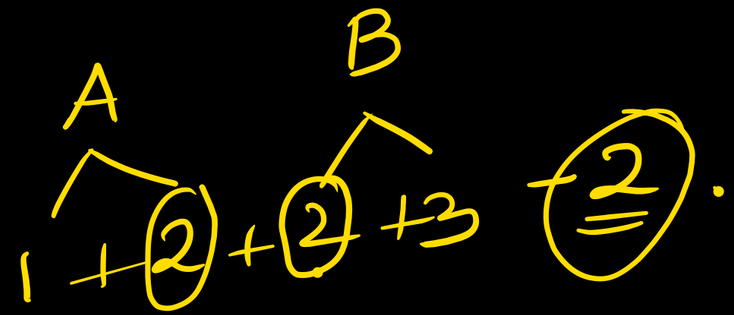
$- A \cap B.$

$A \cup B$.

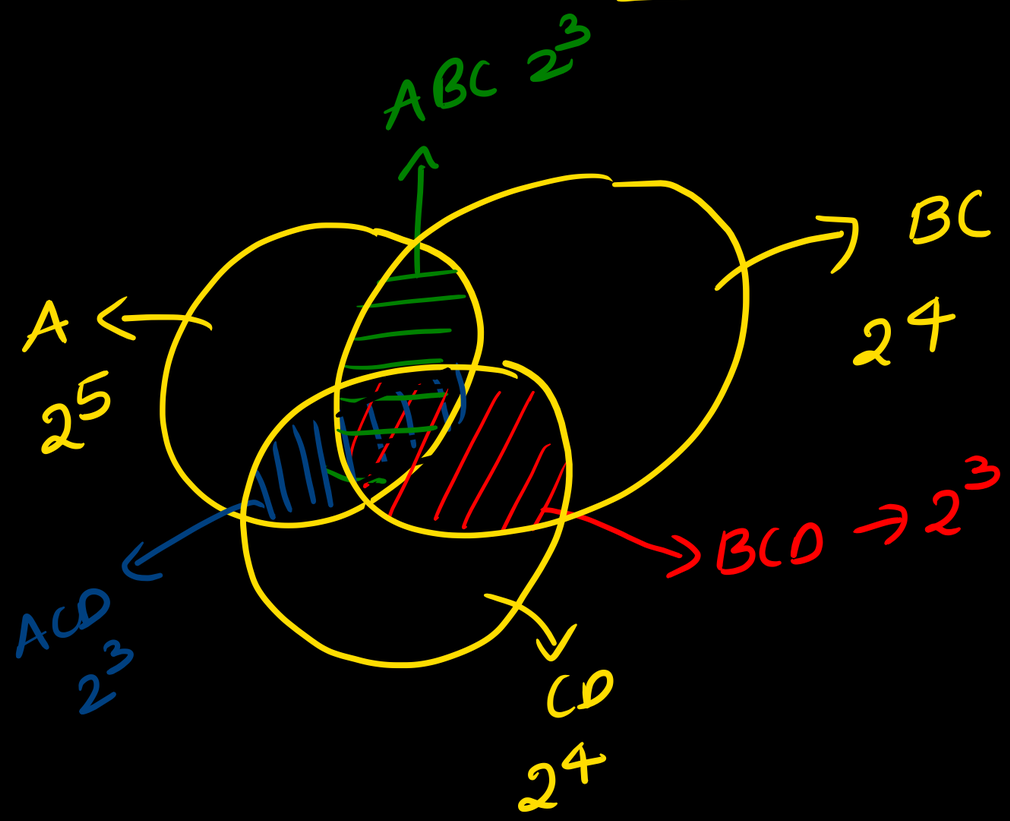


A B

$A \cup B =$ A B



How many SK with R(ABCDEF)
with Candidate keys {A, BC, CD}

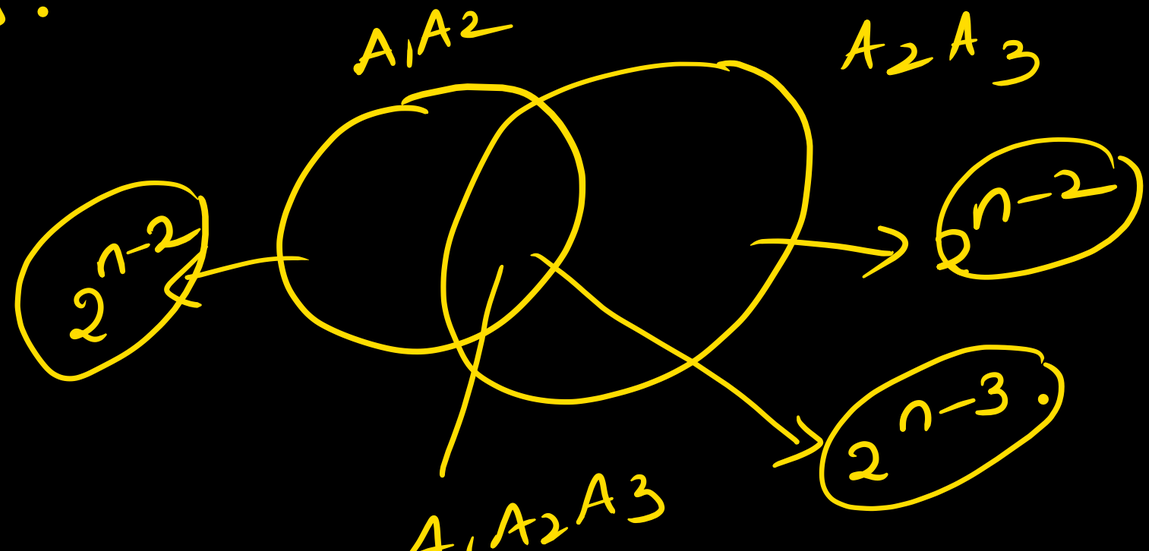


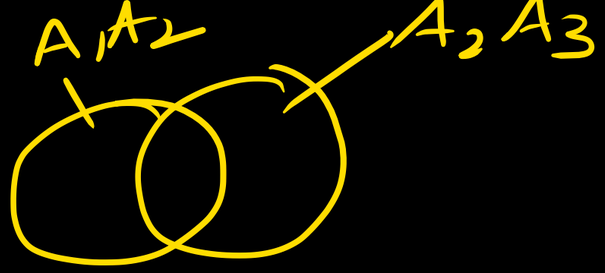
$$n(X \cup Y \cup Z) = n(X) + n(Y) + n(Z) - n(X \cap Y) - n(Y \cap Z) - n(X \cap Z) + n(X \cap Y \cap Z)$$

$$= 32 + 16 + 16 + 8 - 8 - 8 - 8 + 4$$

$$= 44 \text{ Skeys.}$$

How many SK with $R(A_1, A_2 \cdots A_n)$ with $\{A_1A_2, A_2A_3\}$ as Cks.?





A_1A_2 — 2^{n-2} times

$$2^{n-2} + 2^{n-2} - 2^{n-3}$$

$$= 2^{n-3}(2+2-1) = 3 \cdot 2^{n-3}.$$

How many SKs are possible if $R(A_1, A_2, \ldots, A_n)$

total number of subsets $= 2^n$

may be in more

$\{A, B, C\}$

A.
B.
C.
AB.
AC.
BC.
ABC.

2^3 (ϕ) ✗

$2^3 - 1$

But ϕ cannot be a superkey.

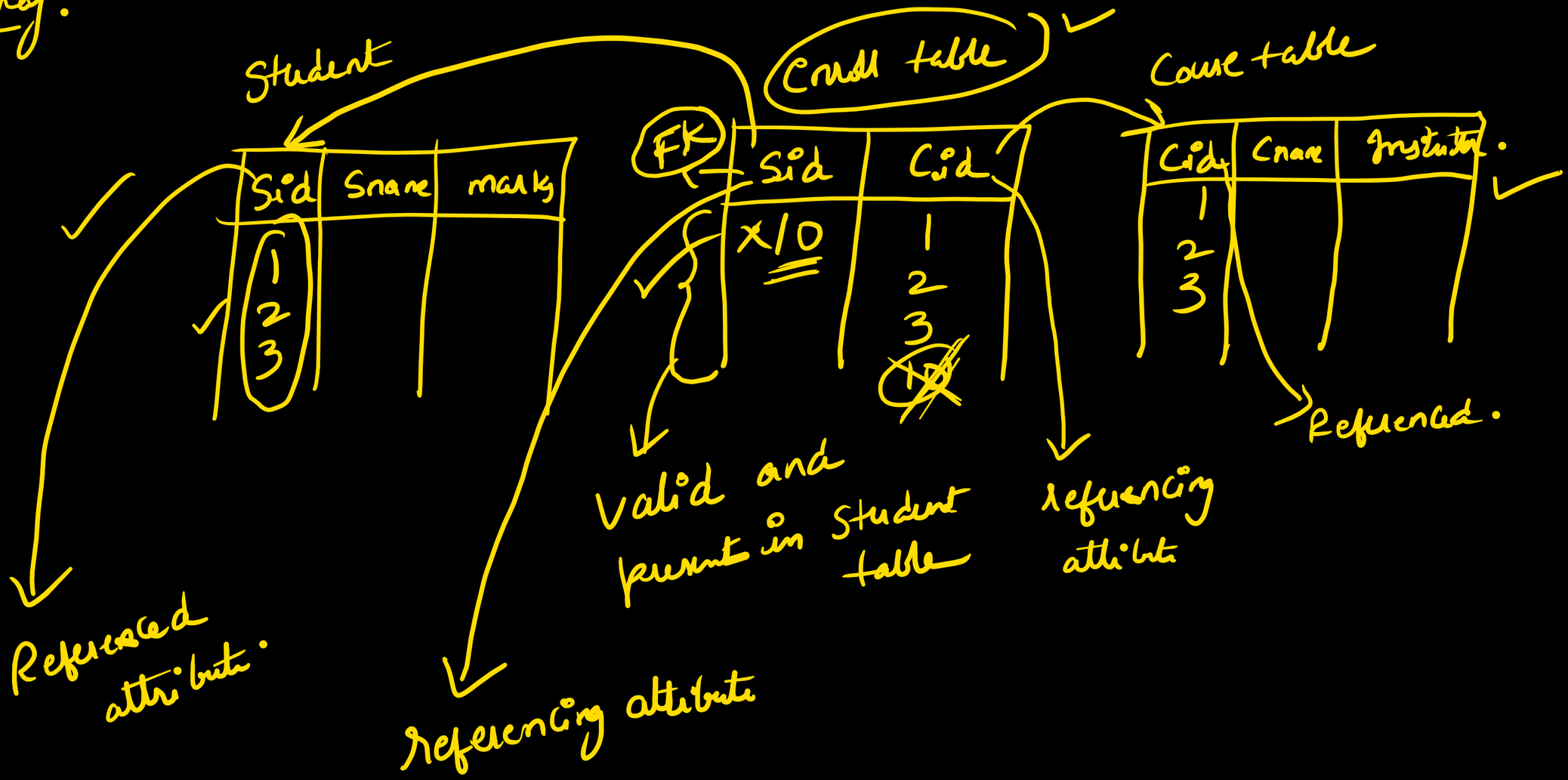
$2^n - 1$

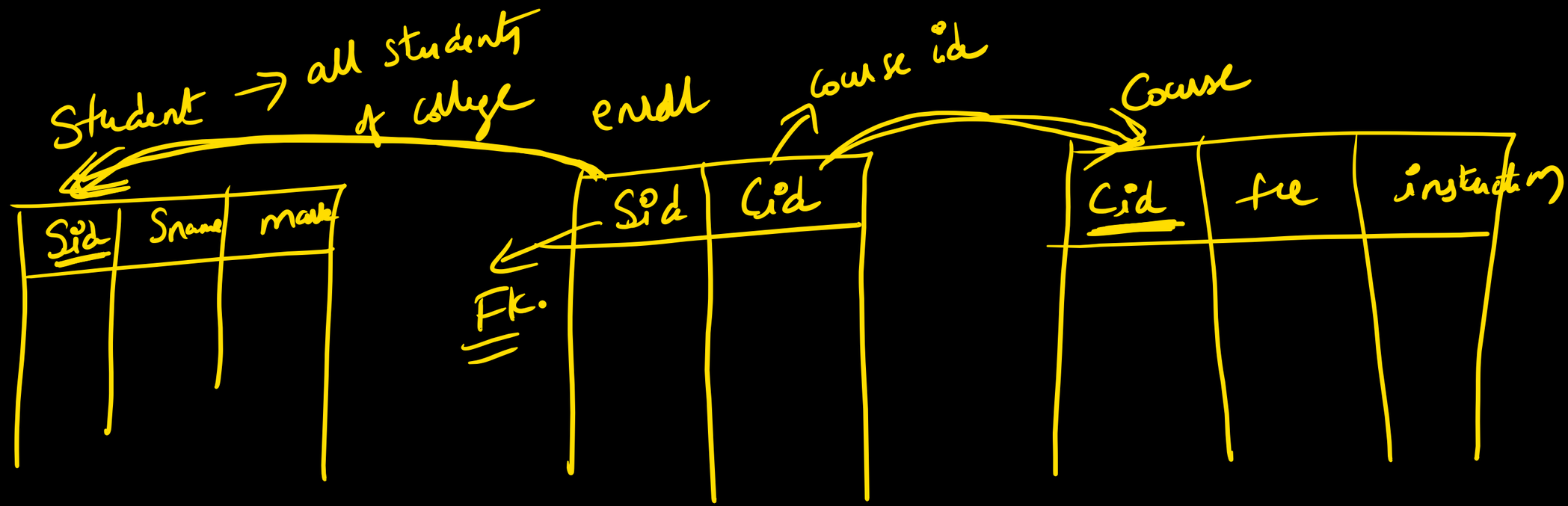
$= \{A, B\}$

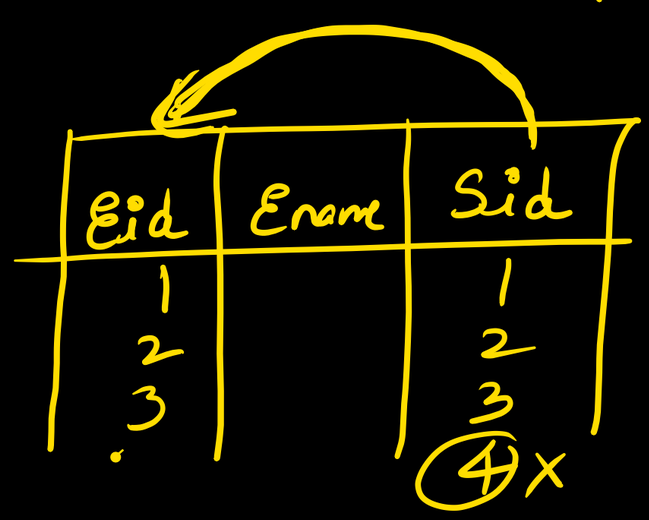
A.
B.
AB.

$2^2 - 1$

Foreign key:


Student
Sid
Sname
marks
1
2
3
Crosstable
FK
Sid
Cid
x10
1
2
3
Course table
Cid
Cname
Institute.
1
2
3
Referenced.
Referenced attribute.
Valid and present in Student table
Referencing attribute
Referencing attribute





Every supervisor is also an employee.

Foreign Key:

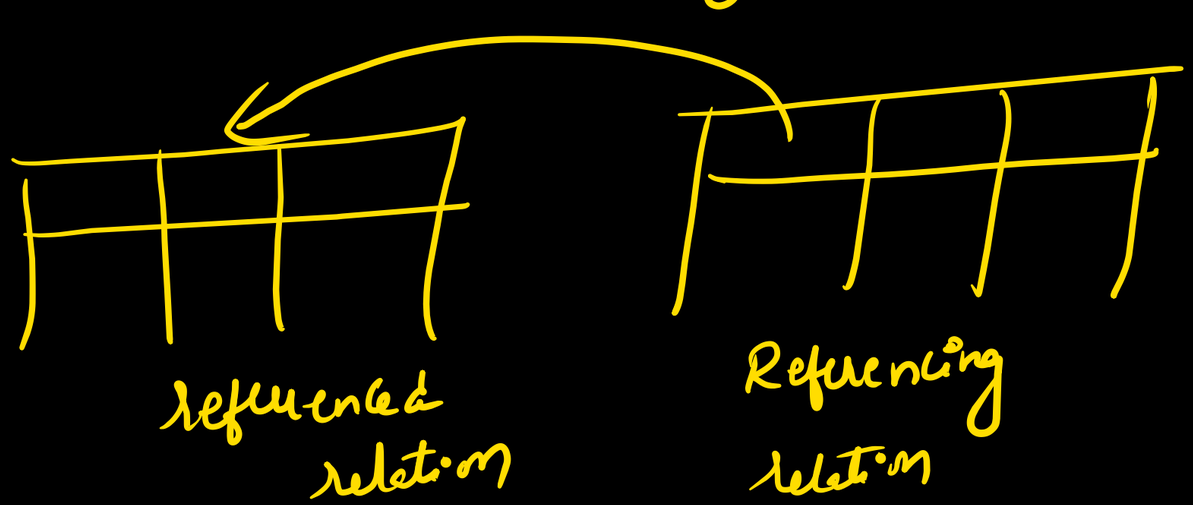
→ used to Create relationships b/w tables.

→ Defined over two relations (Some time one relation)

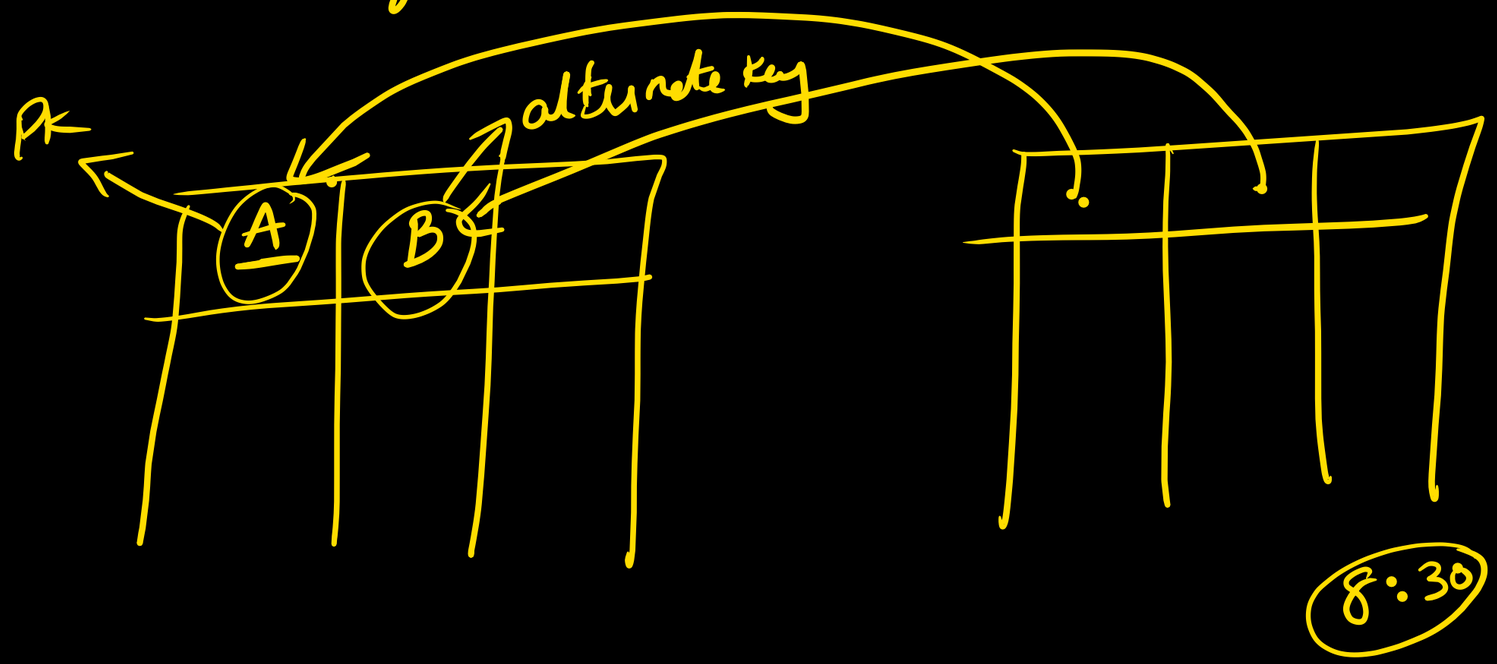
→ Referenced relation

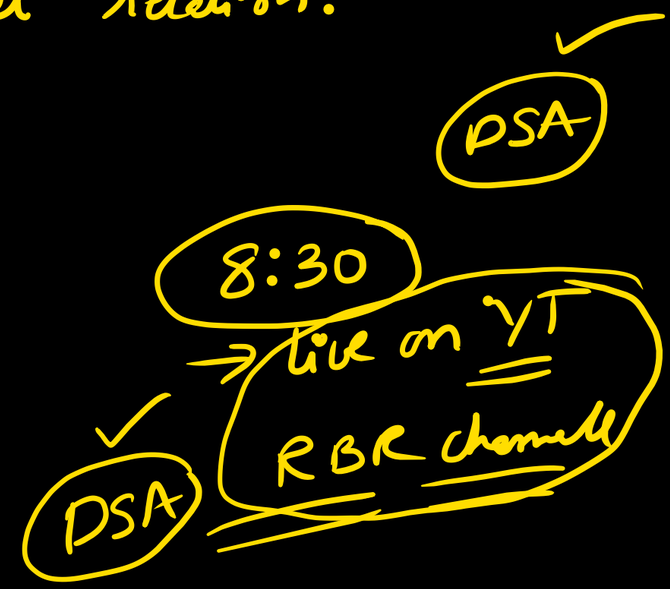
→ Referencing relation

Relation → Table



Def: FK is set of attributes that references to primary key/ alternate key of same relation / some other relation.





FK attribute
Referencing attribute

PK/AK
Referenced attribute

X and y can be from same table or diff table

Ex:

Student

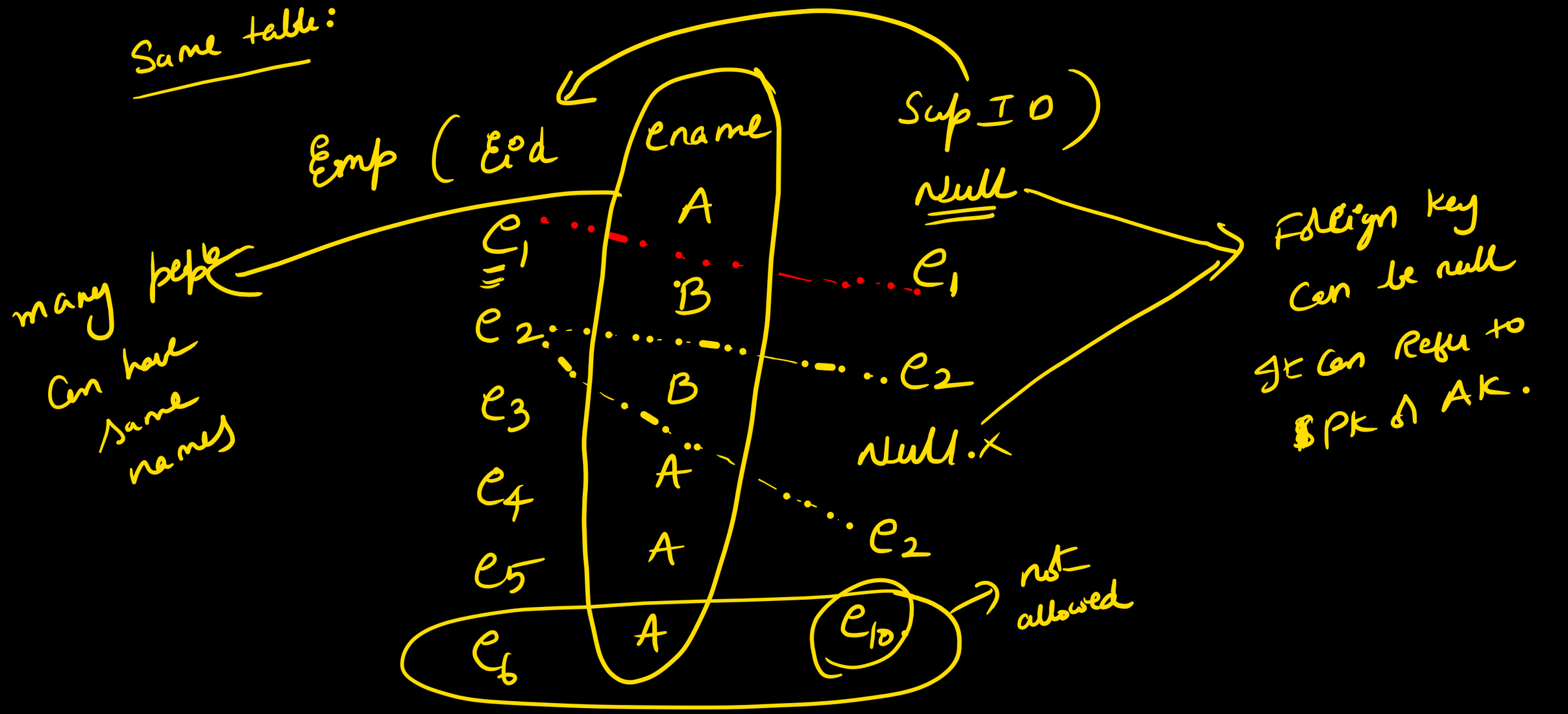
Sid	Sname	DoB
S_1	A	1990
S_2	A	1992
S_3	B	1990
S_5	A	1990
S_4	B	1990

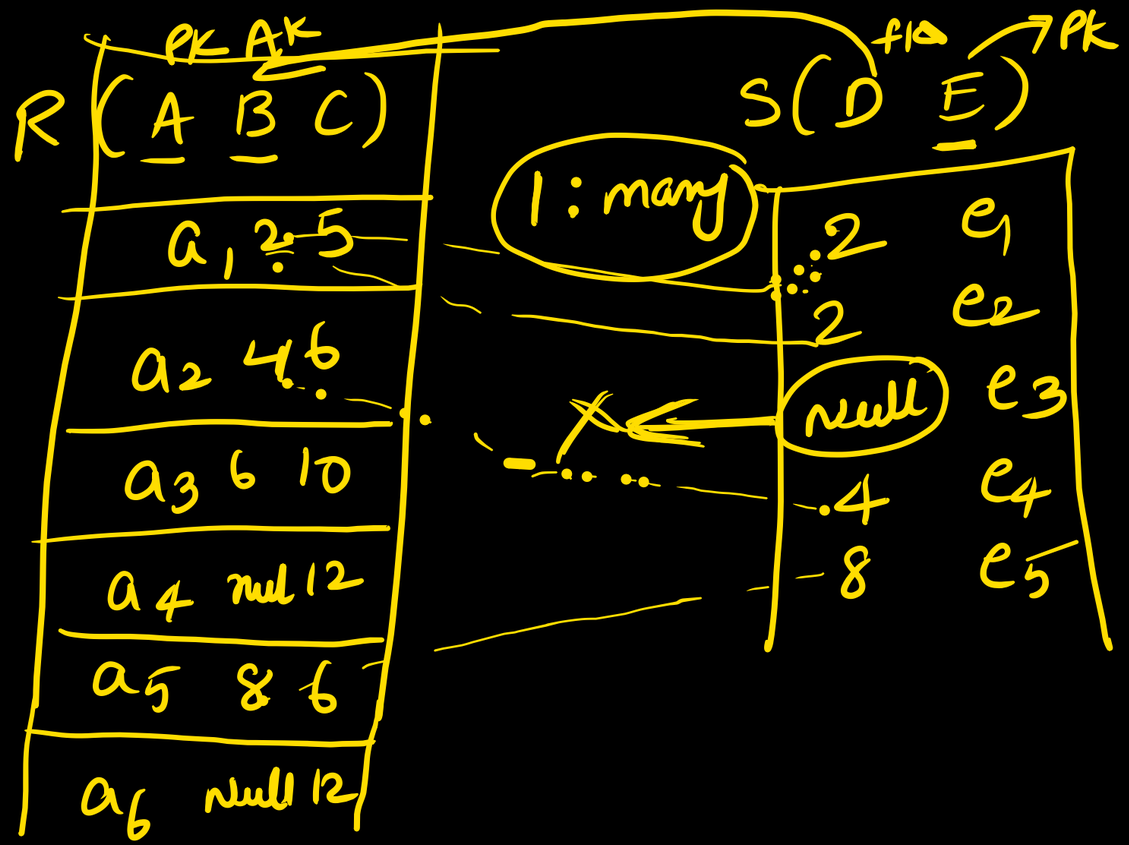
Enroll (Sid, Cid, fee)

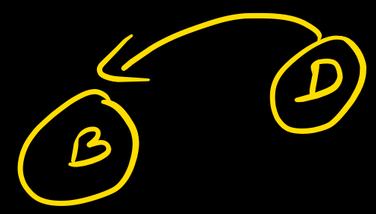
Sid	Cid	fee
S_1	C_1	500
S_1	C_2	100
S_2	C_3	100
S_4	C_4	100
S_{10}	C_4	400

not allowed.

Same table:


Emp (Eid
ename
SupID)
many people
Can have same names
e1
e2
e3
e4
e5
e6
A
B
B
A
A
A
Null
e1
e2
Null.x
e2
e10
not allowed
Foreign key
Can be null
It can Refer to
PK & AK.





Alternative Key can have null values.

Primary Key → no nulls

→ FK can refer to alternate key also.

→ FK attribute sets allows nulls.

→ referencing rel record whose FK value is null is not related to any referenced rel record. .

→ B/w referenced : referencing relation

1 : m

Referenced → referencing
(1) (many)