

ER model: Entity relationship model.

- High level representation of DB design.
- Diagrammatic representation of DB design

Steps to design DB:

- 1) Requirements
- 2) Conceptual / logical DB design → FR.
- 3) Apply normalization
- 4) Physical DB design
- 5) Application / security

Attributes:

Attribute



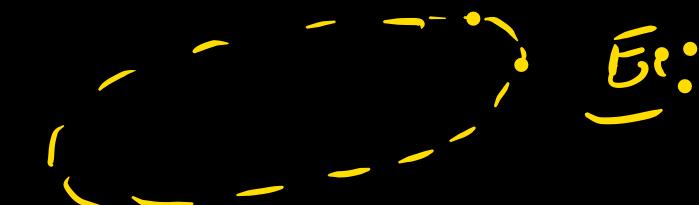
Key attribute



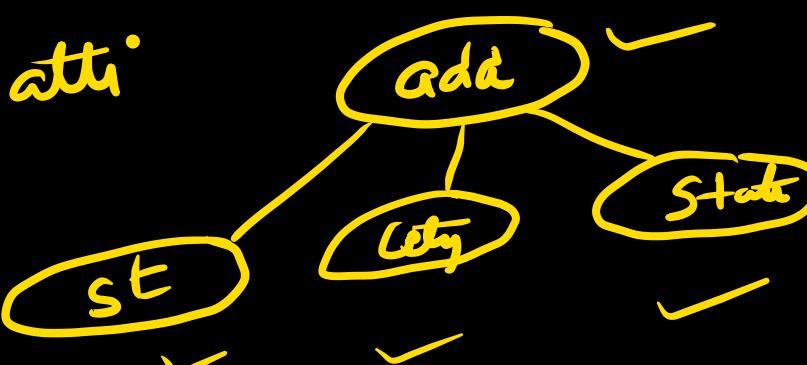
multi valued
attribute



derived



Composite atti



Ex: phone no : 123, 456, 789.

Ex:

DOB

2020

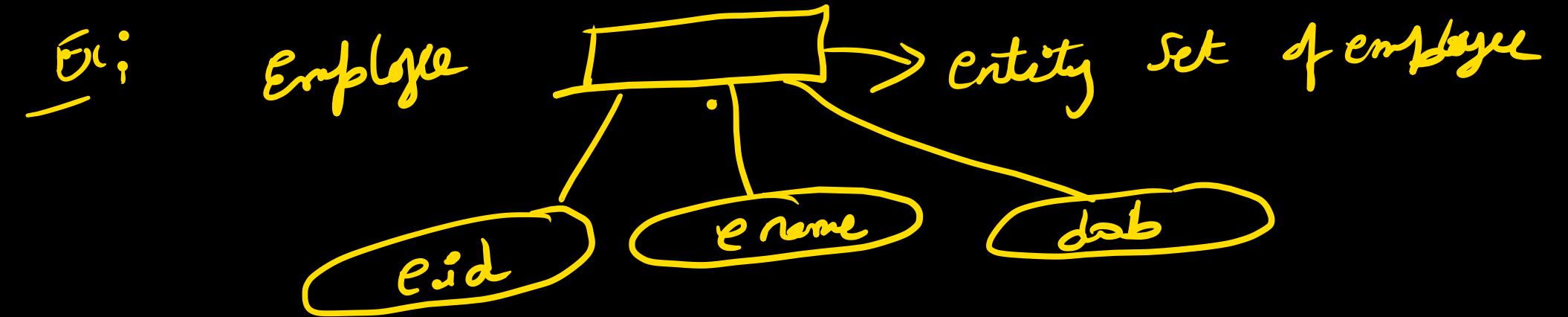
stored

age
4 years.

derived —

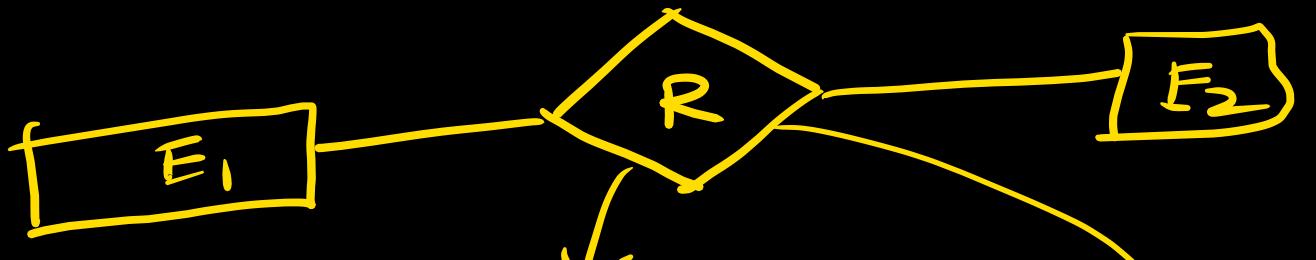
Entity set: (Relation \wedge table)

Set of similar entities \equiv (Tuples) \wedge (Rows)



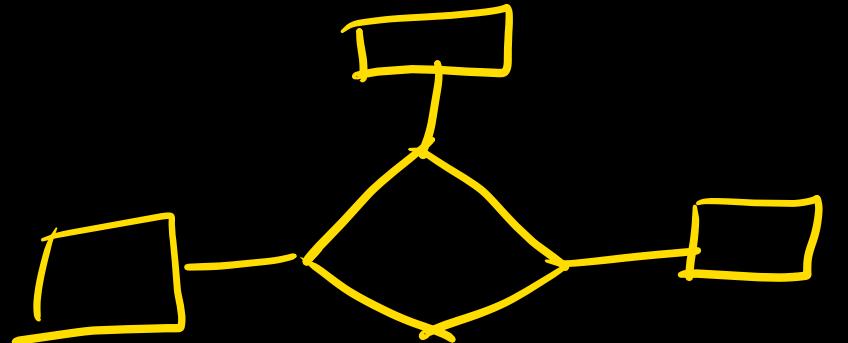
Relationship set :

Relates two or more entity sets

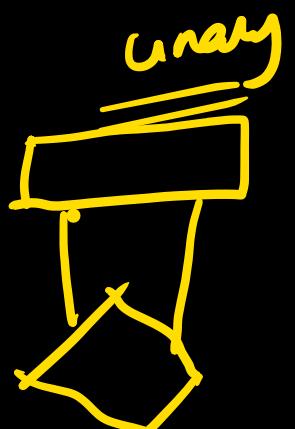


Relationship set

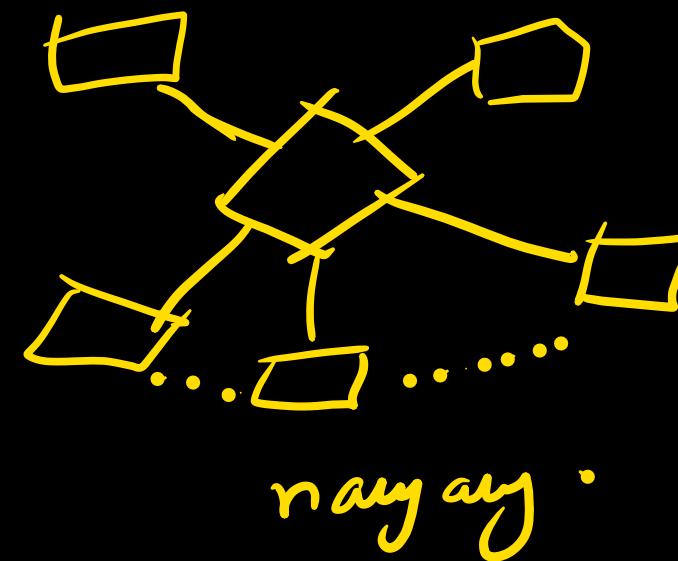
Binary.



Ternary

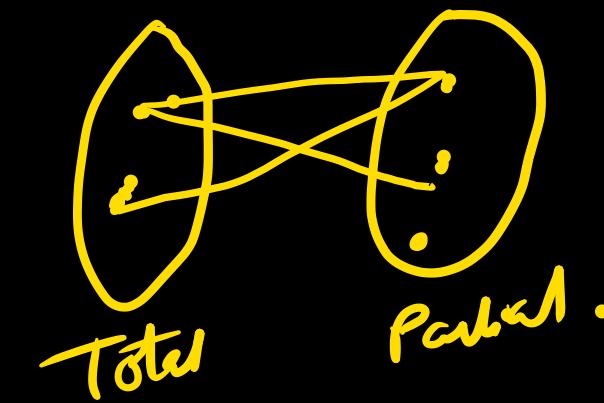
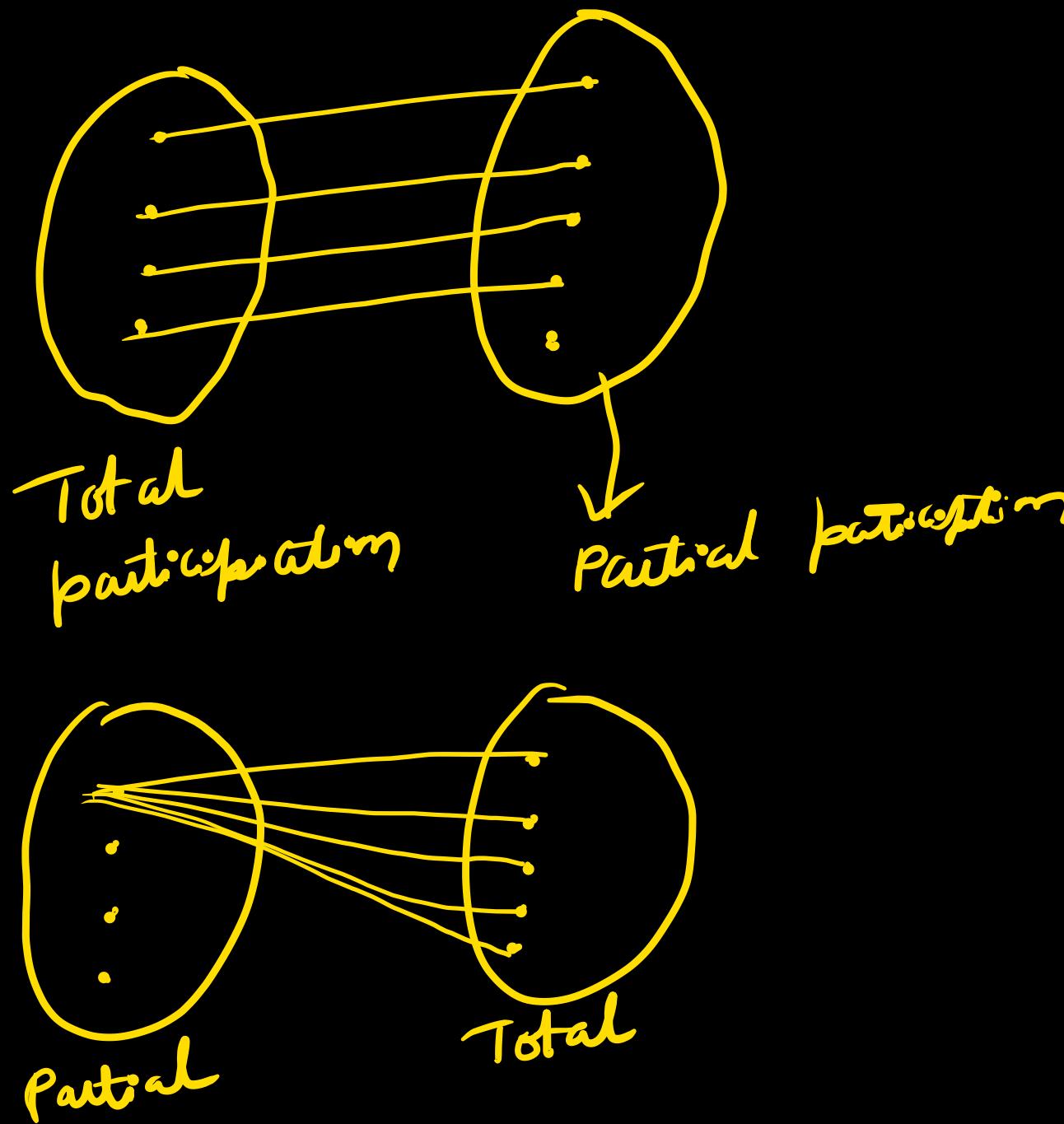


Unary



many many.

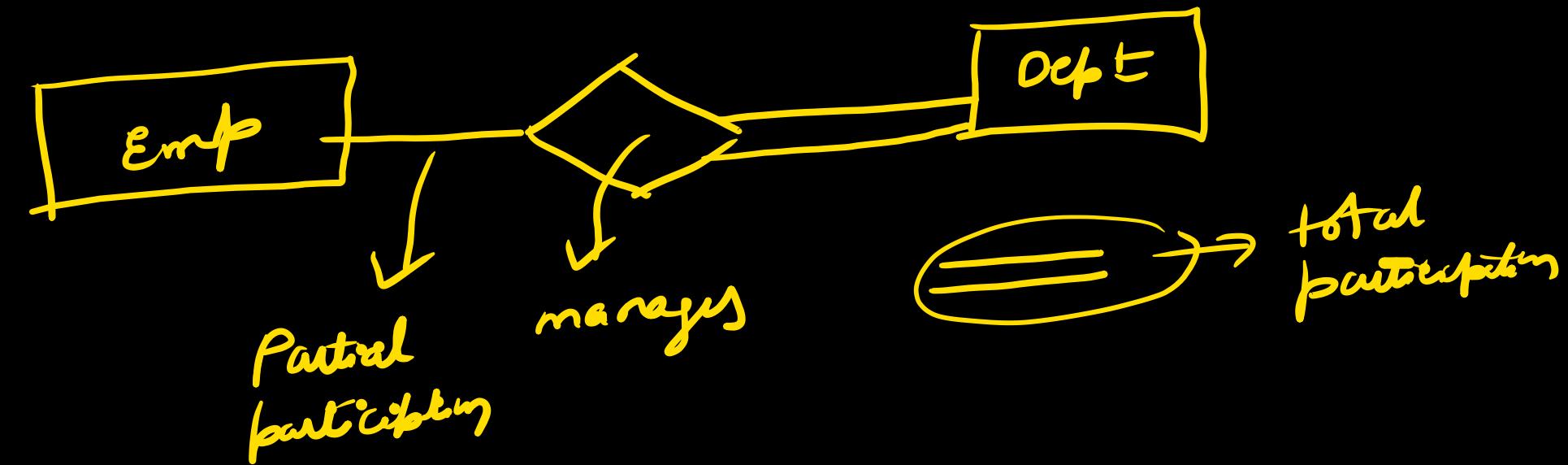
Participation :

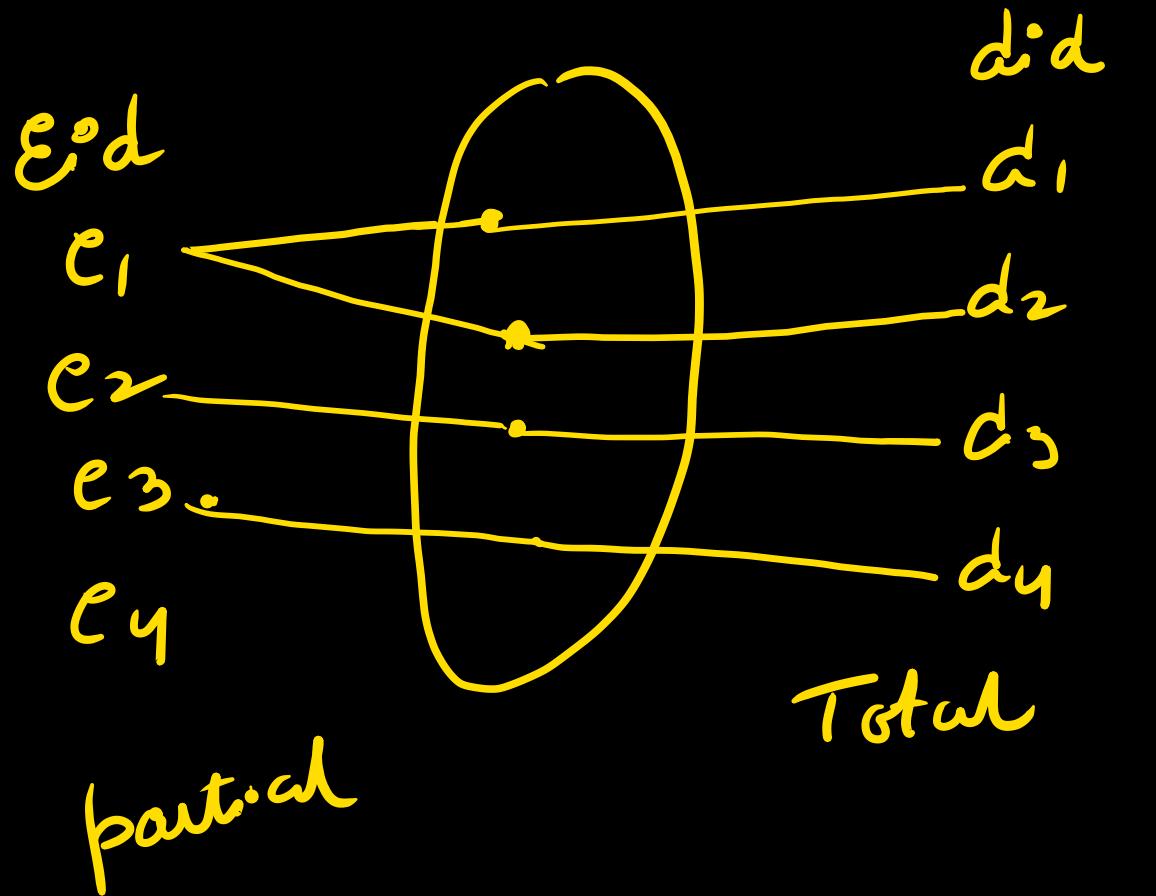


Participation:

If every entity of a entity set participates in relationship set, then it is called total participation. Otherwise partial participation.

Ex: Emp and Dept are entity sets. MANAGES is relationship set such that there should be a manager for every dept.



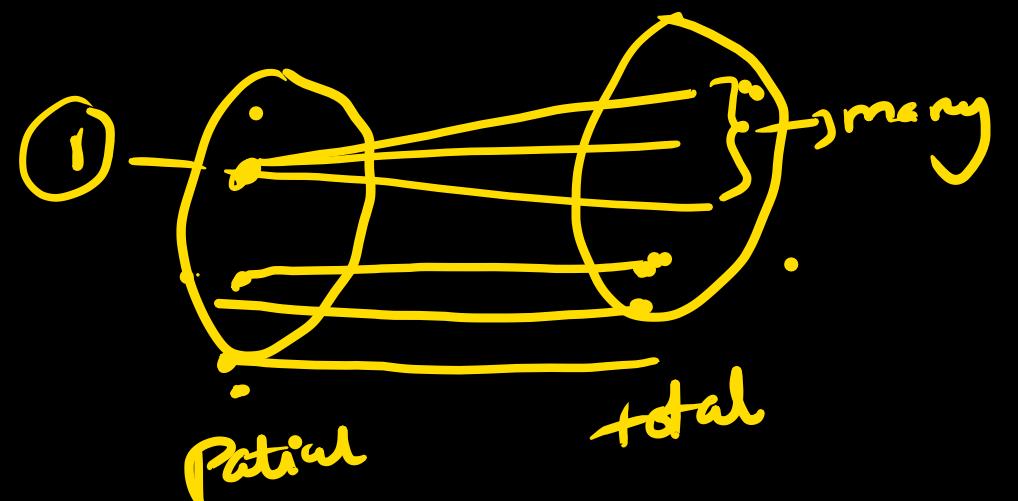


Cardinality mapping:

- ↳ one (at most one) (\rightarrow)
 0..1
- ↳ many (0 or more) (\leftarrow)
 0...*

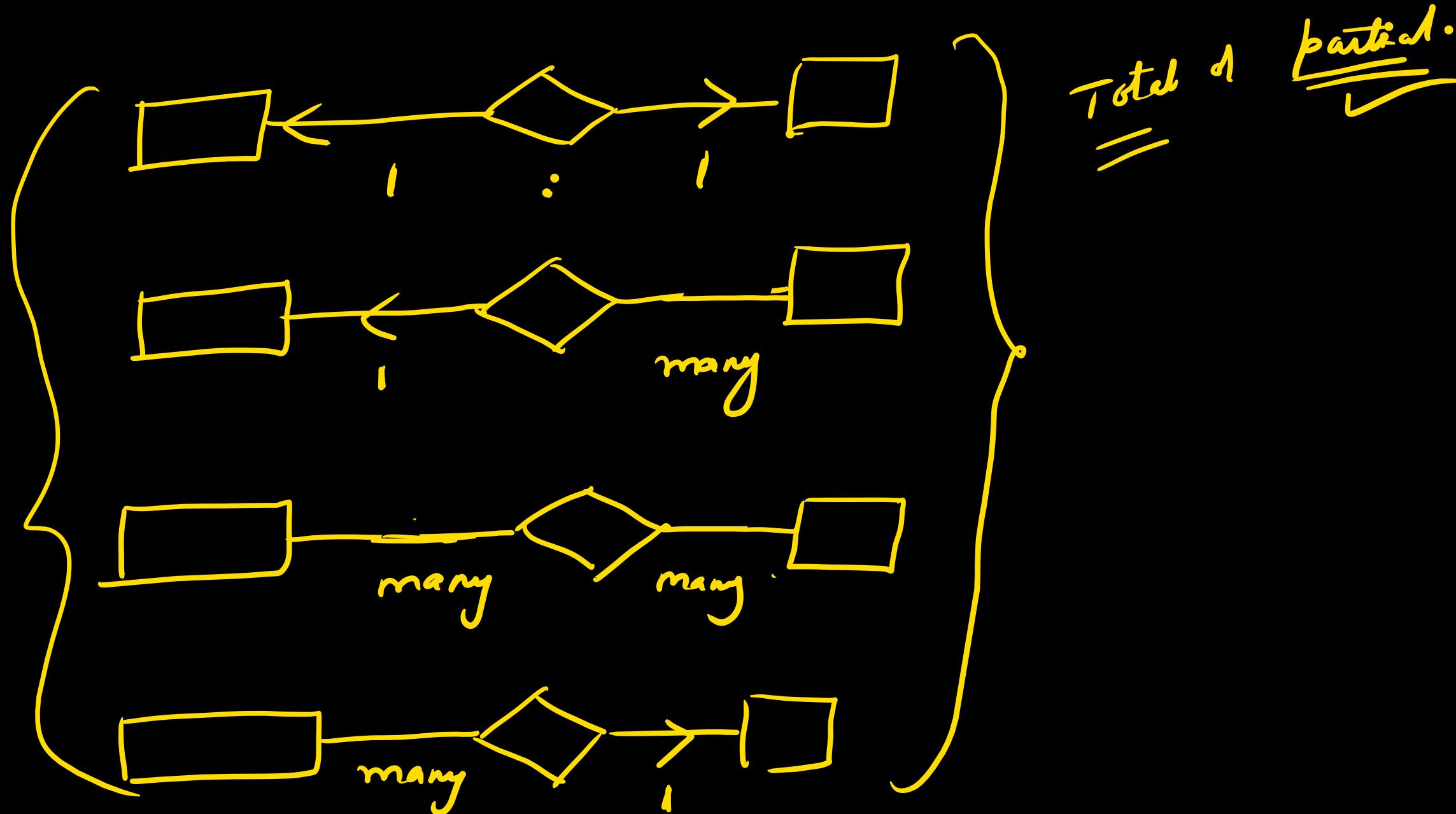
1:m \rightarrow one employee can manage
many departments

\exists means all departments
has ~~one~~ a manager
m:1 \rightarrow every dept has at most
one manager

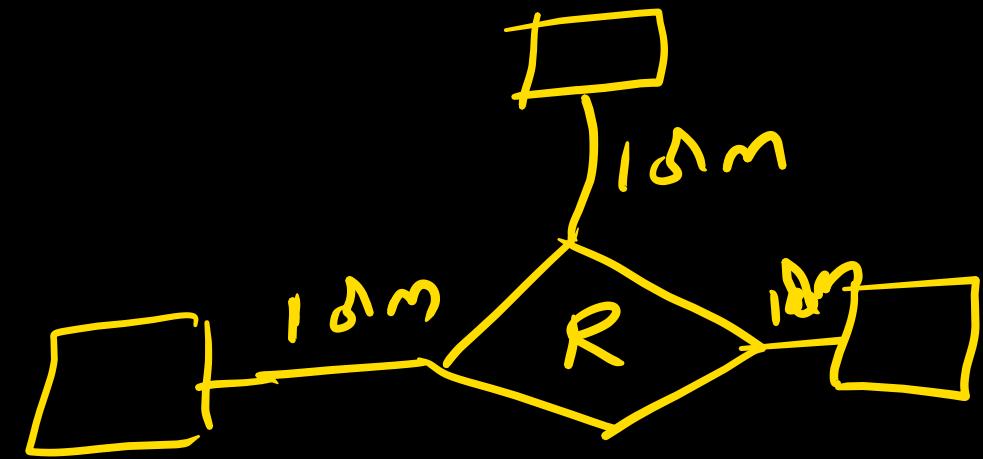


1 to many
—>
1 to many
—<

Binary relationships set:



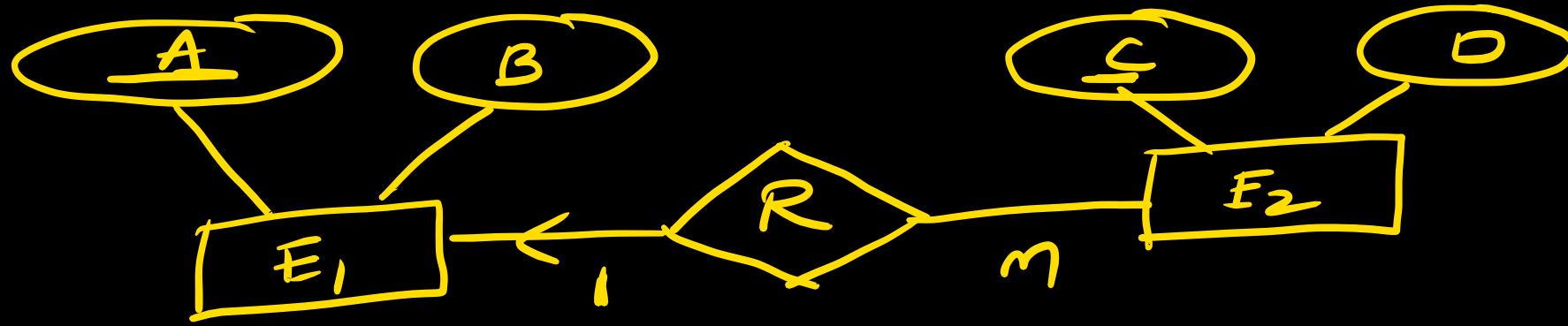
Ternary relationships :



$$\overline{2} \times \overline{2} \times \overline{2} \Rightarrow 8 \Leftarrow$$

Q

One to many mapping:



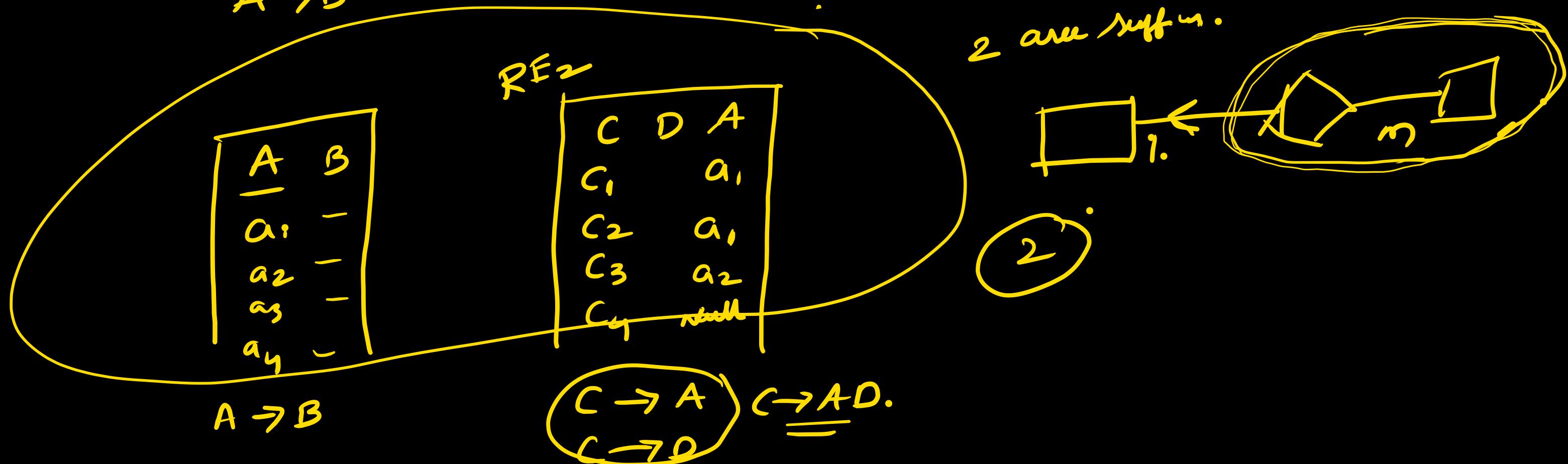
one element of first set can be mapped to many elements of II set. one element of II set can be mapped & to atmost one element of I set

E_1	A	B
	a_1	-
	a_2	-
	a_3	-
	a_4	-
	$A \rightarrow B$	

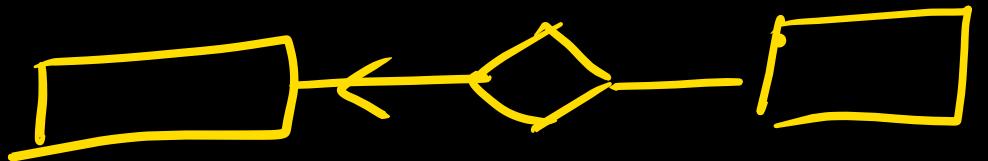
R

E_2	C	A
	c_1	a_1
	c_2	a_1
	c_3	a_2
	c_4	-
	$C \rightarrow A$	

E_2	C	D
	c_1	-
	c_2	-
	c_3	-
	c_4	-
	$C \rightarrow D$	



Q:

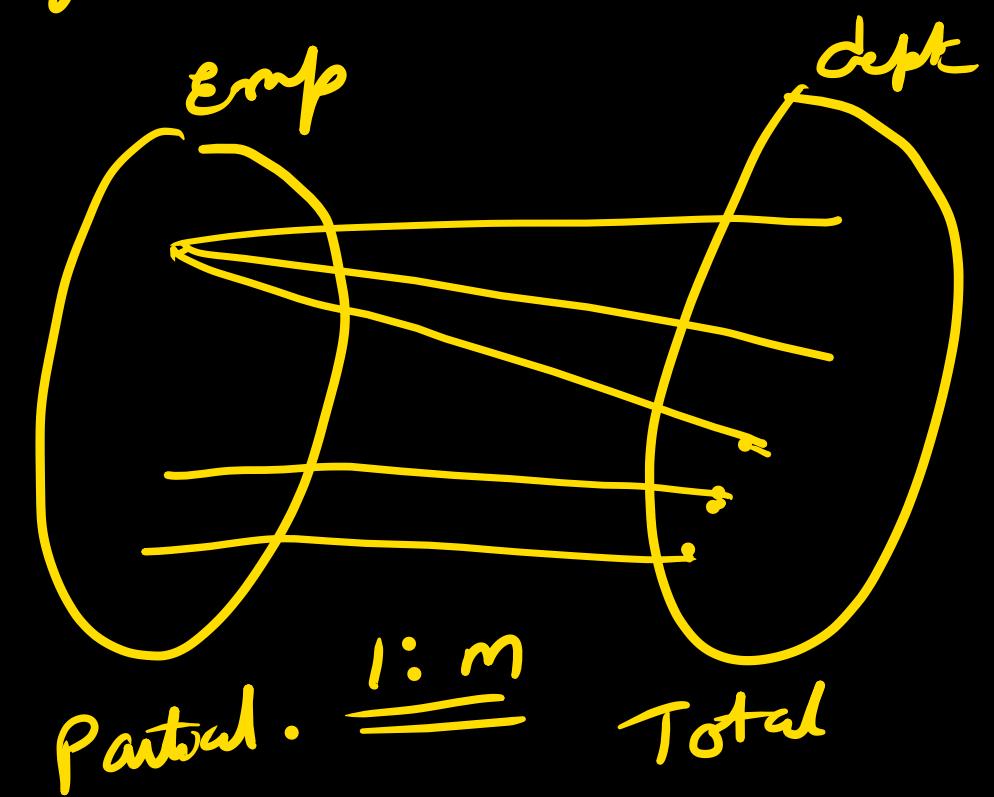


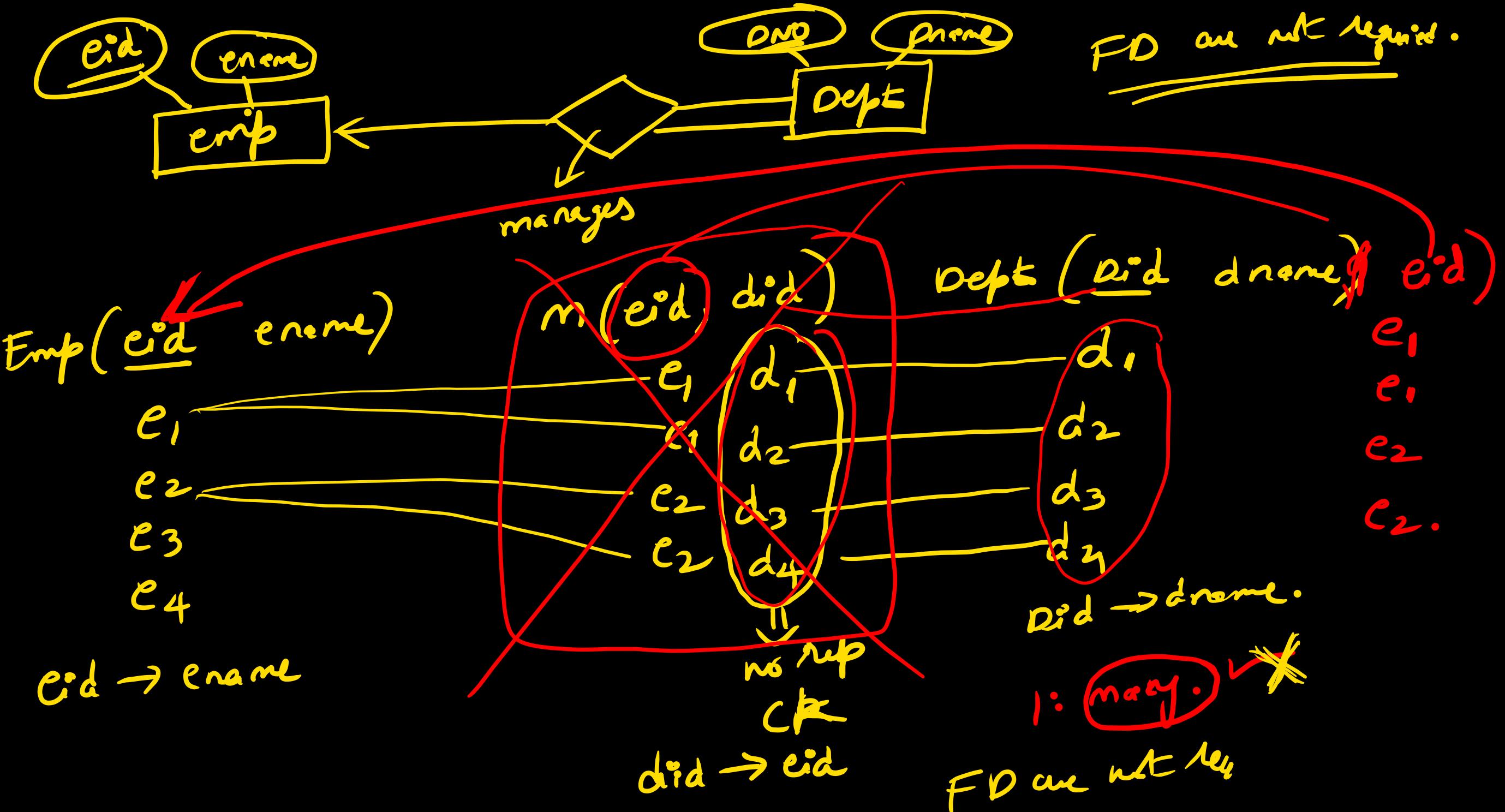
3 tables are sufficient

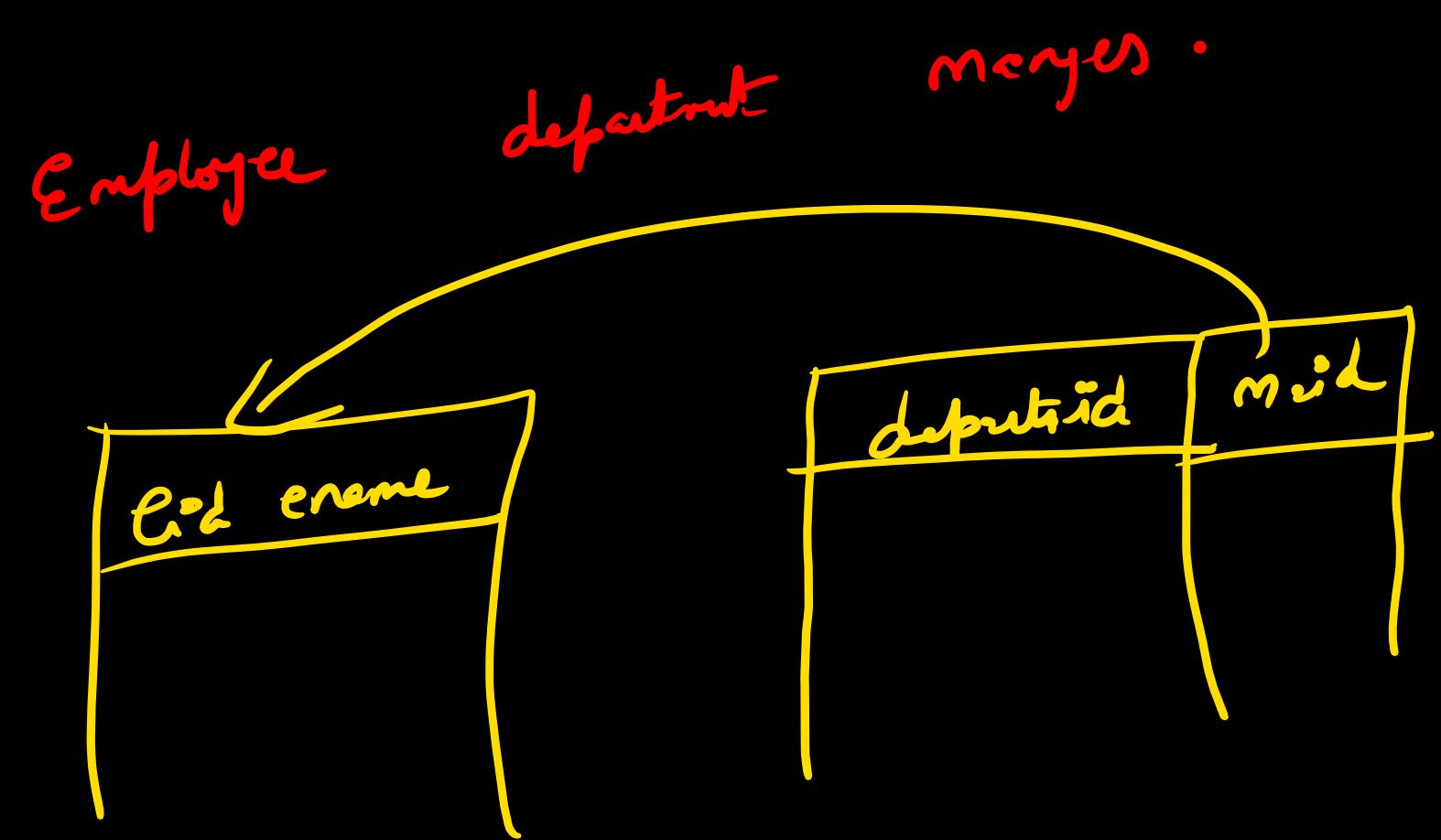


Can we do it in two table?

Ex: Emp & Dept are two entities and manages rel set is 1:m.
Each Emp can manage many dept. Each dept must be
managed by ~~an~~ exactly 1 employee.

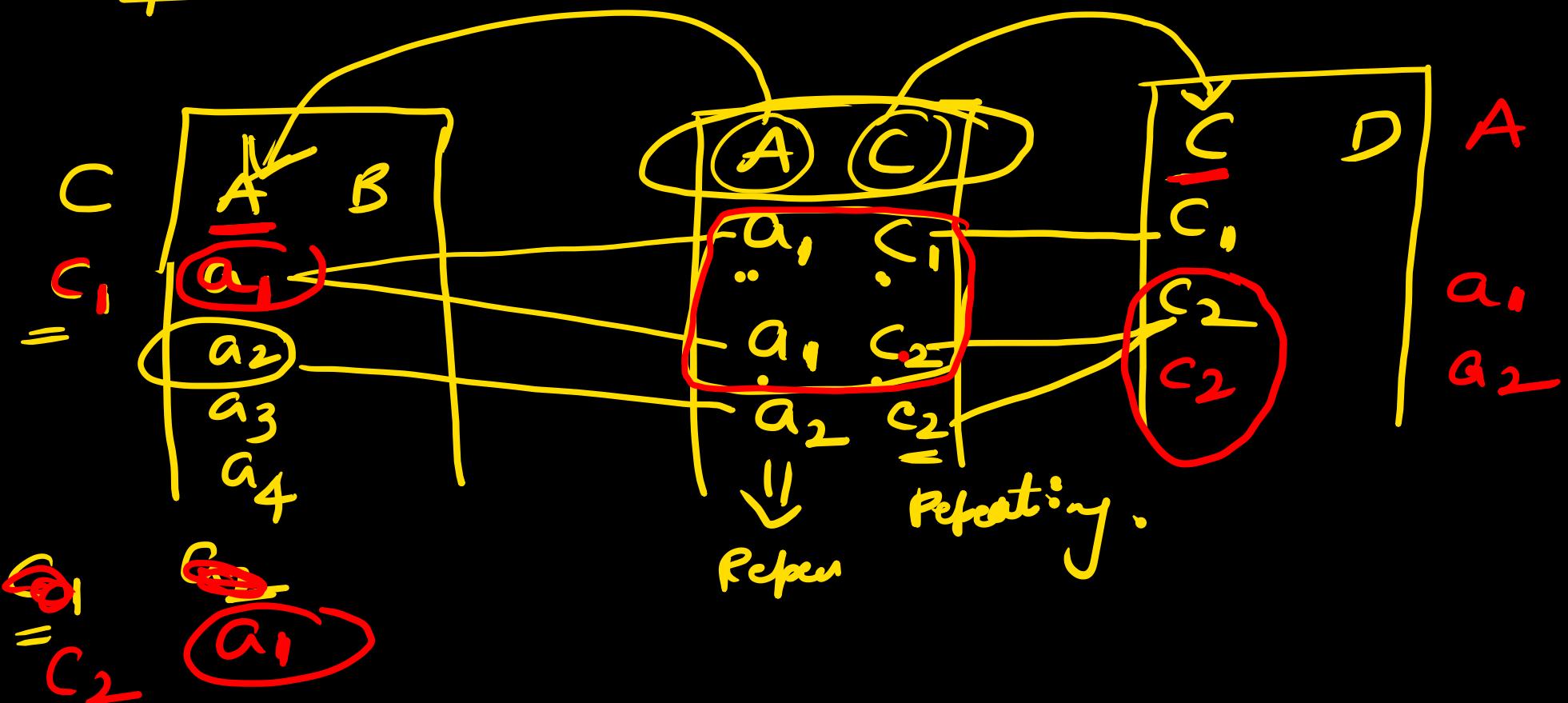
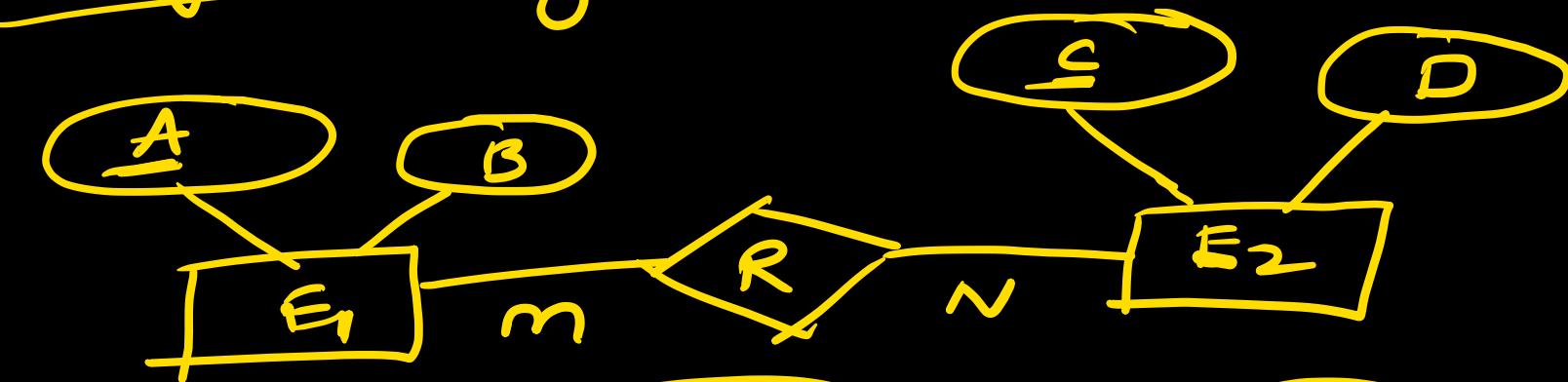






In 1 to many mapping relationship set combines with many side
If there is total participation, then we will not any nulls.
If there is partial participation there may be nulls.

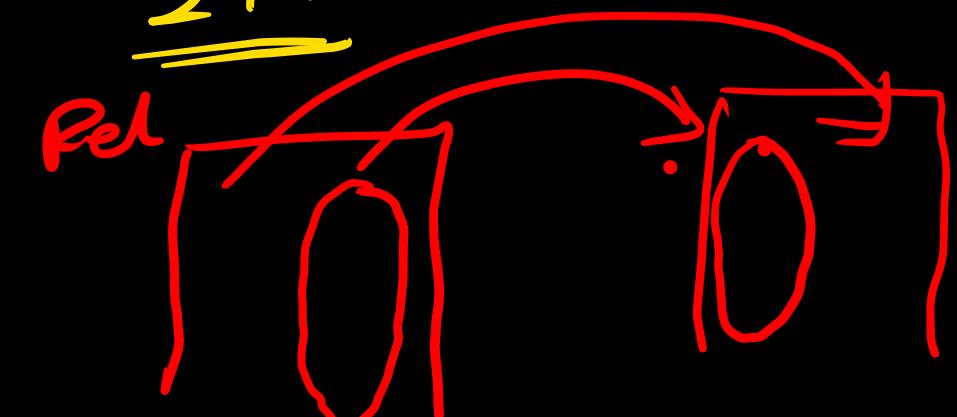
many to many:



m:N relation
3 tables

i) $E_1, E_2, Rel.$

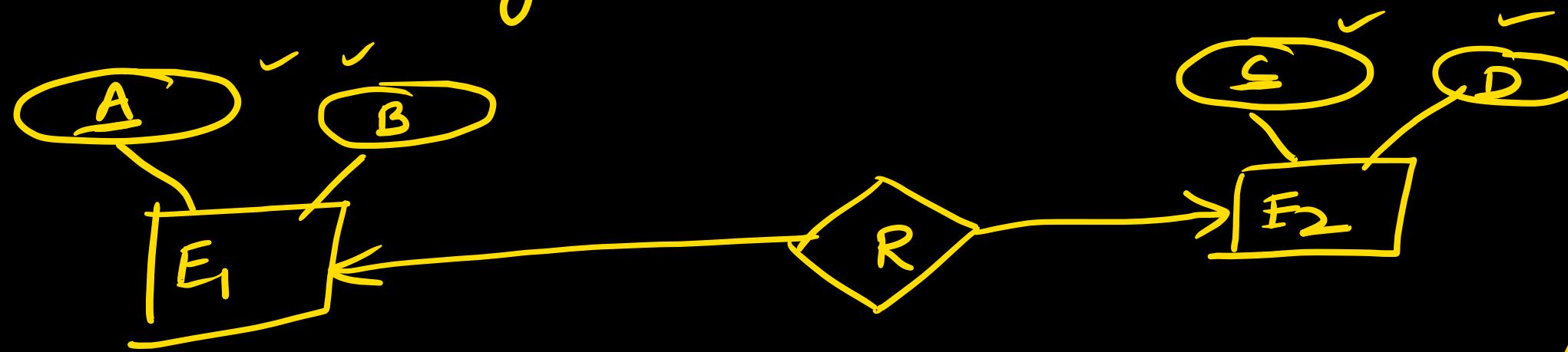
2 FF's



One to one mapping:

1:1 mapping

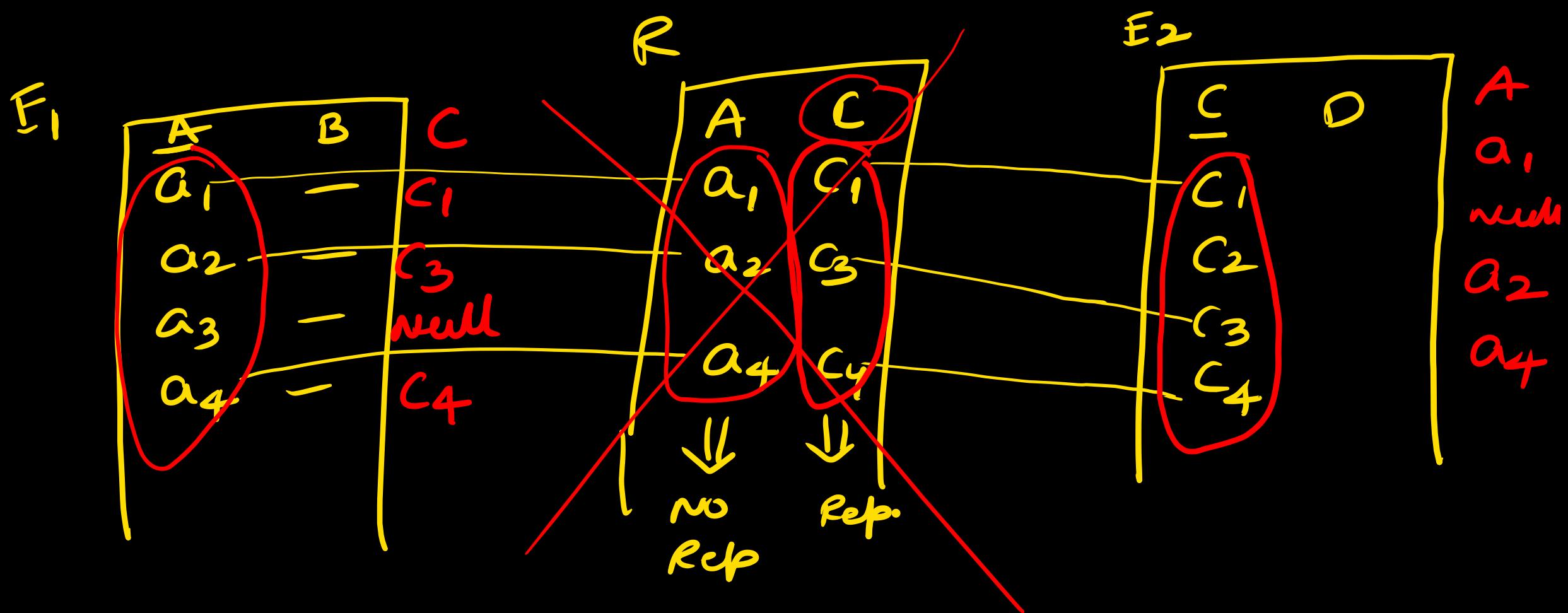
b/w E₁, E₂ with partial participation at both ends.



1:1 means one object of E₁ can relate to **atmost** one object of E₂. And one object of E₂ is related to **atmost** one object of E₁.

0..1

0..1



1: 1 with partial

we need

~~at least~~ 2 table

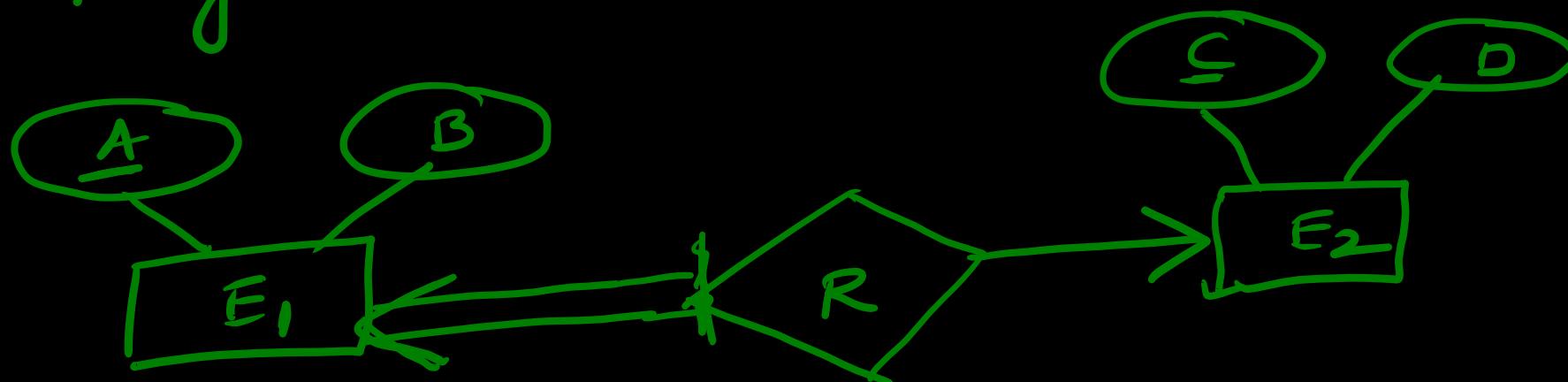
merge with

left & right

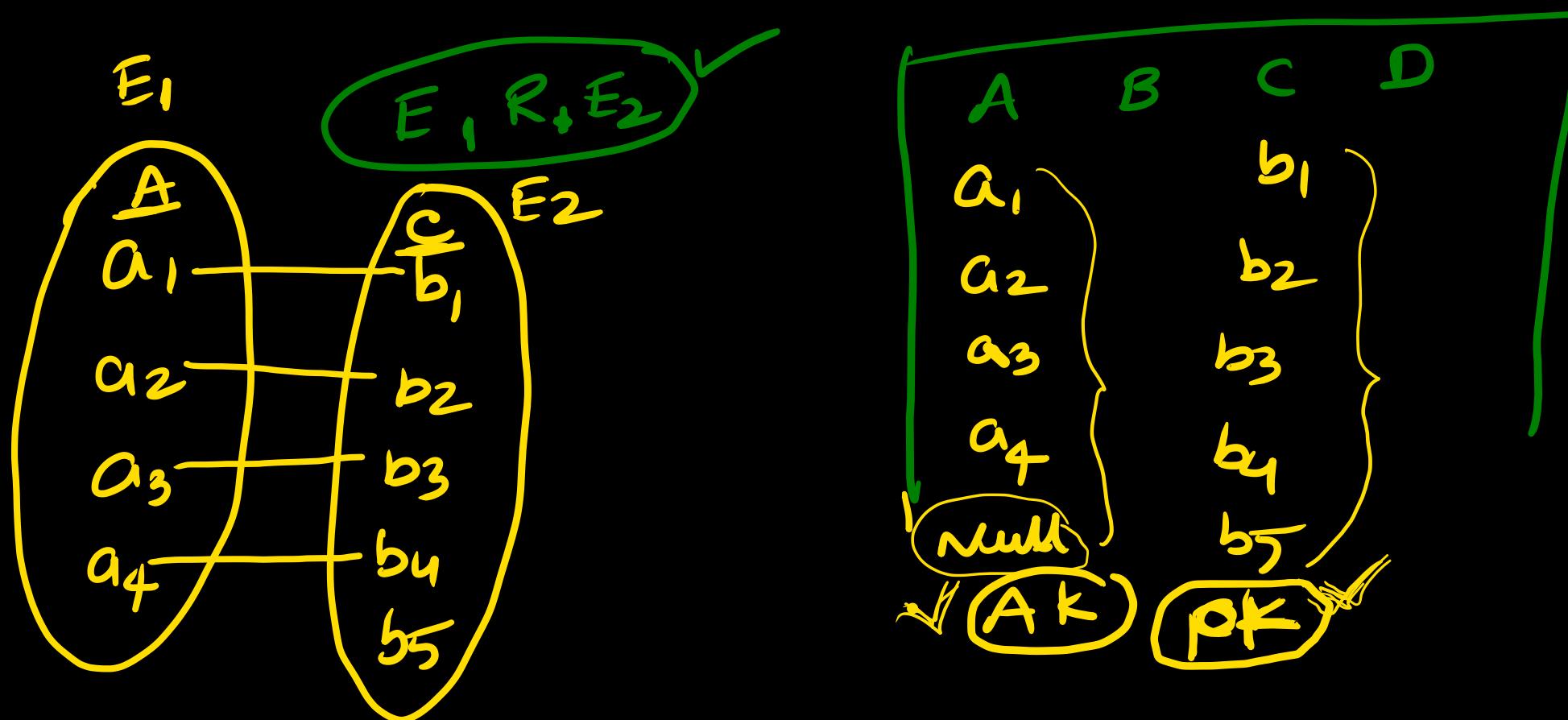
1:1 mapping

between b/w E_1, E_2 with atleast one end is total

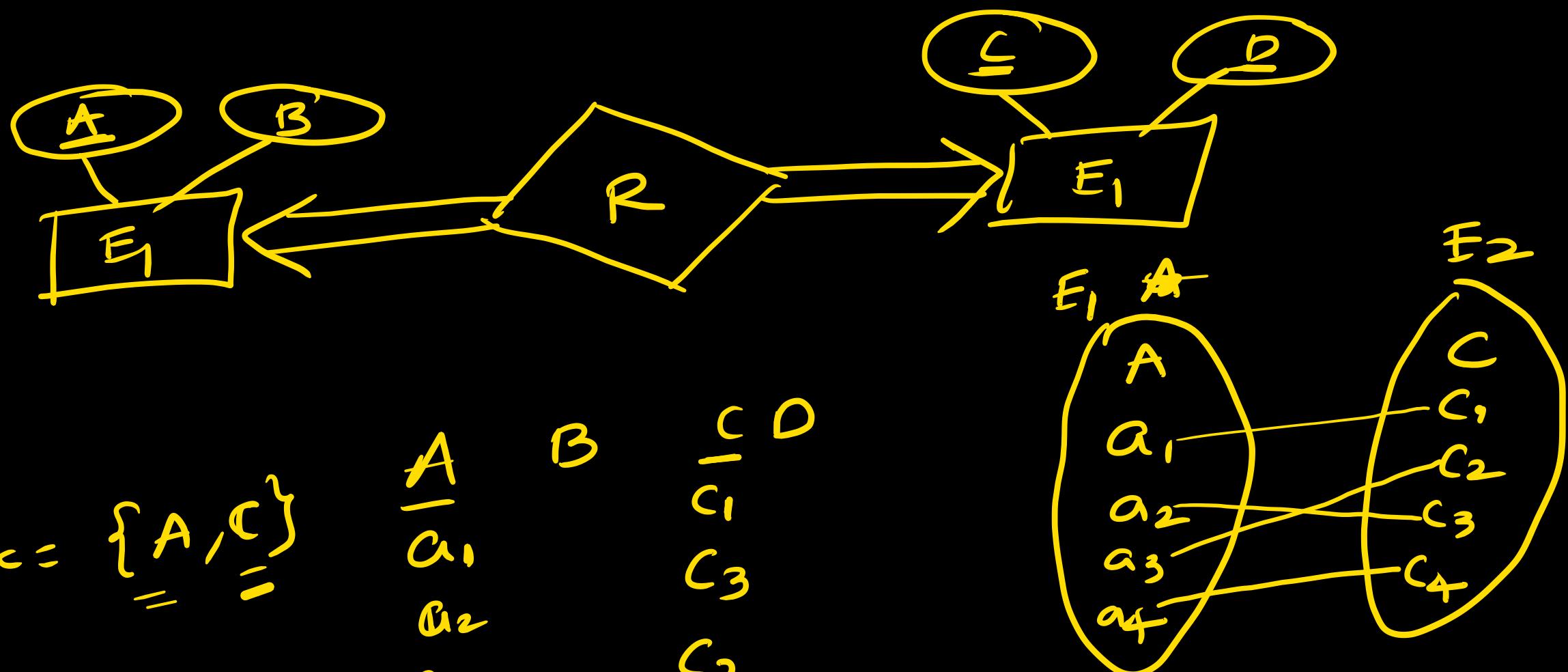
participating:



1:1 at m total.



② 1:1 with b/w E_1, E_2 with ~~at least~~ one both ends total participation

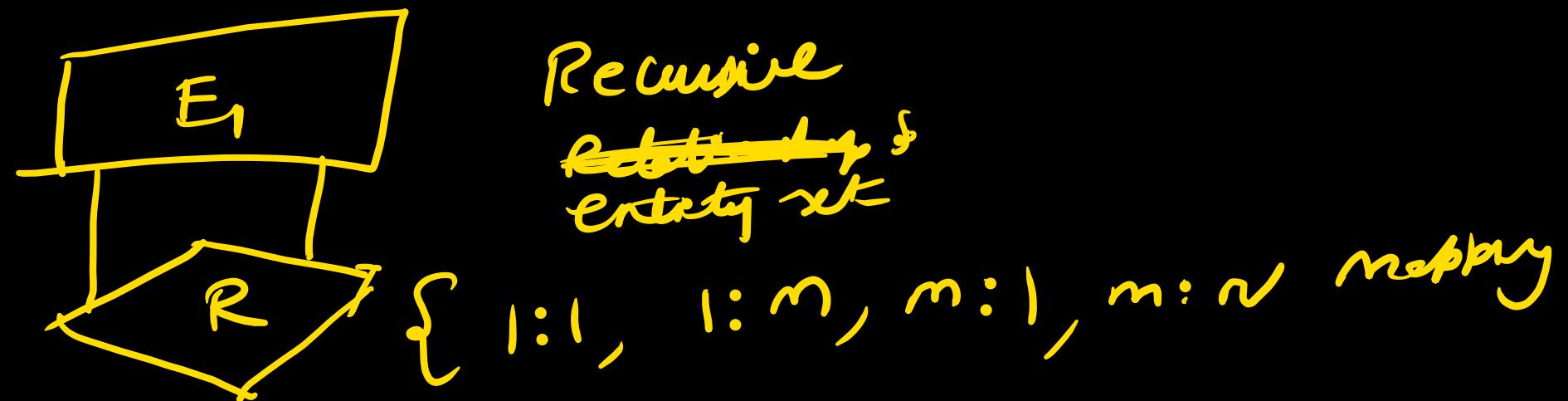


$$C = \{A, C\}$$

$\frac{A}{a_1}$	B	$\frac{C}{c_1}$	D
a_2		c_3	
a_3		c_2	
a_4		c_4	
\downarrow		\downarrow	
non rep.		not rep.	

Self referential relationship set :-

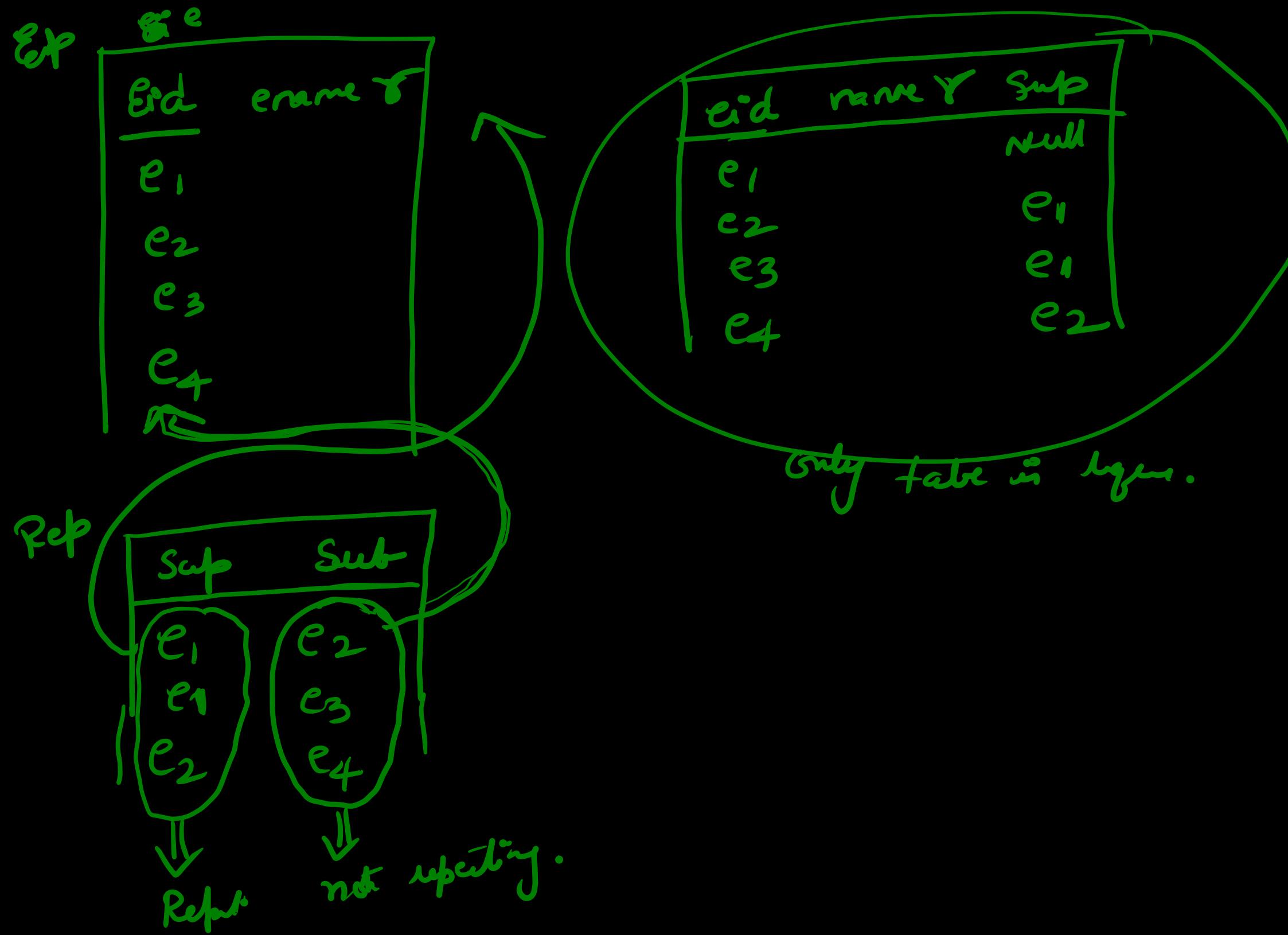
Entities of entity set (E) related to some some of the entities of same entity set .



Self referenced 1: many:

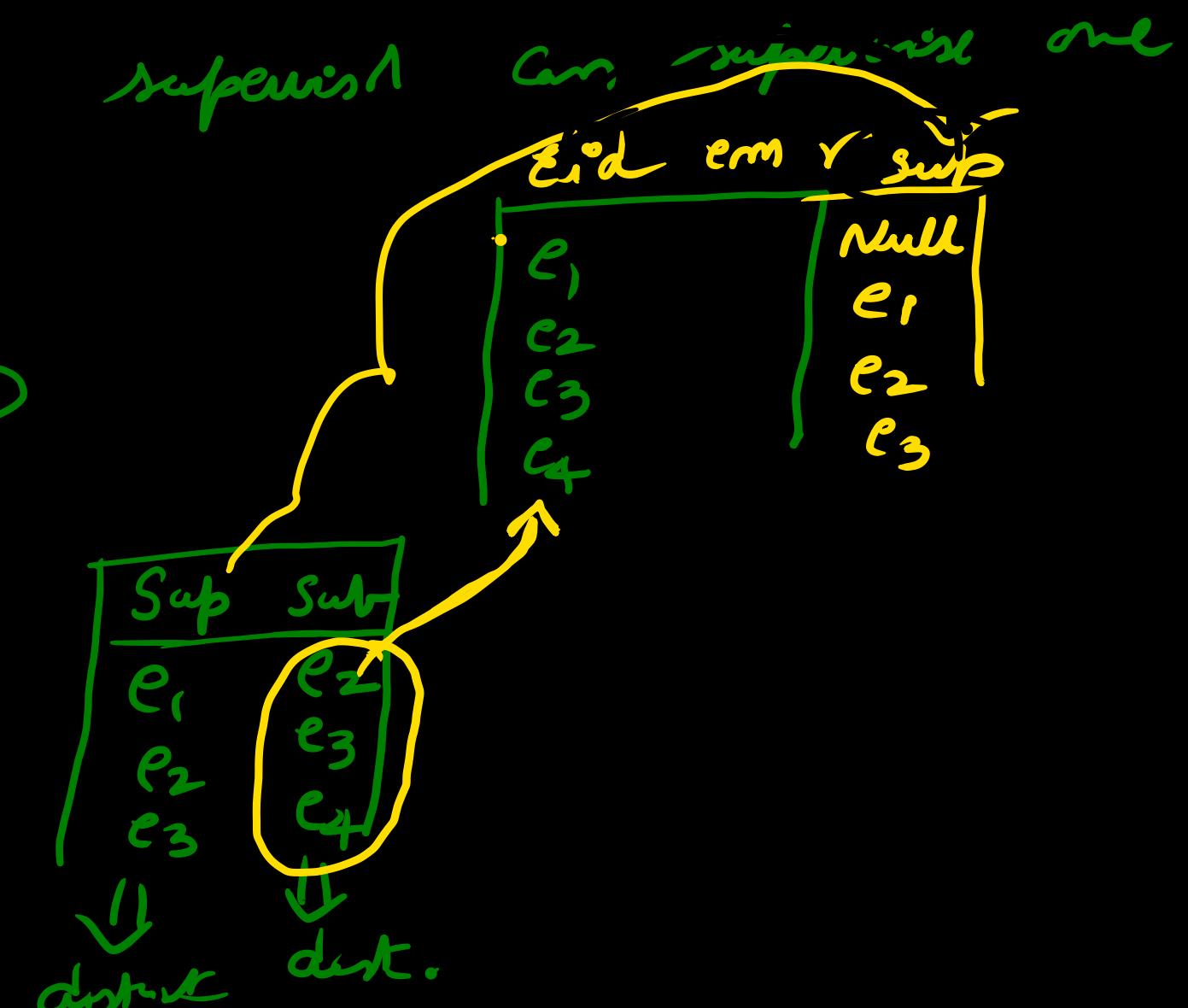
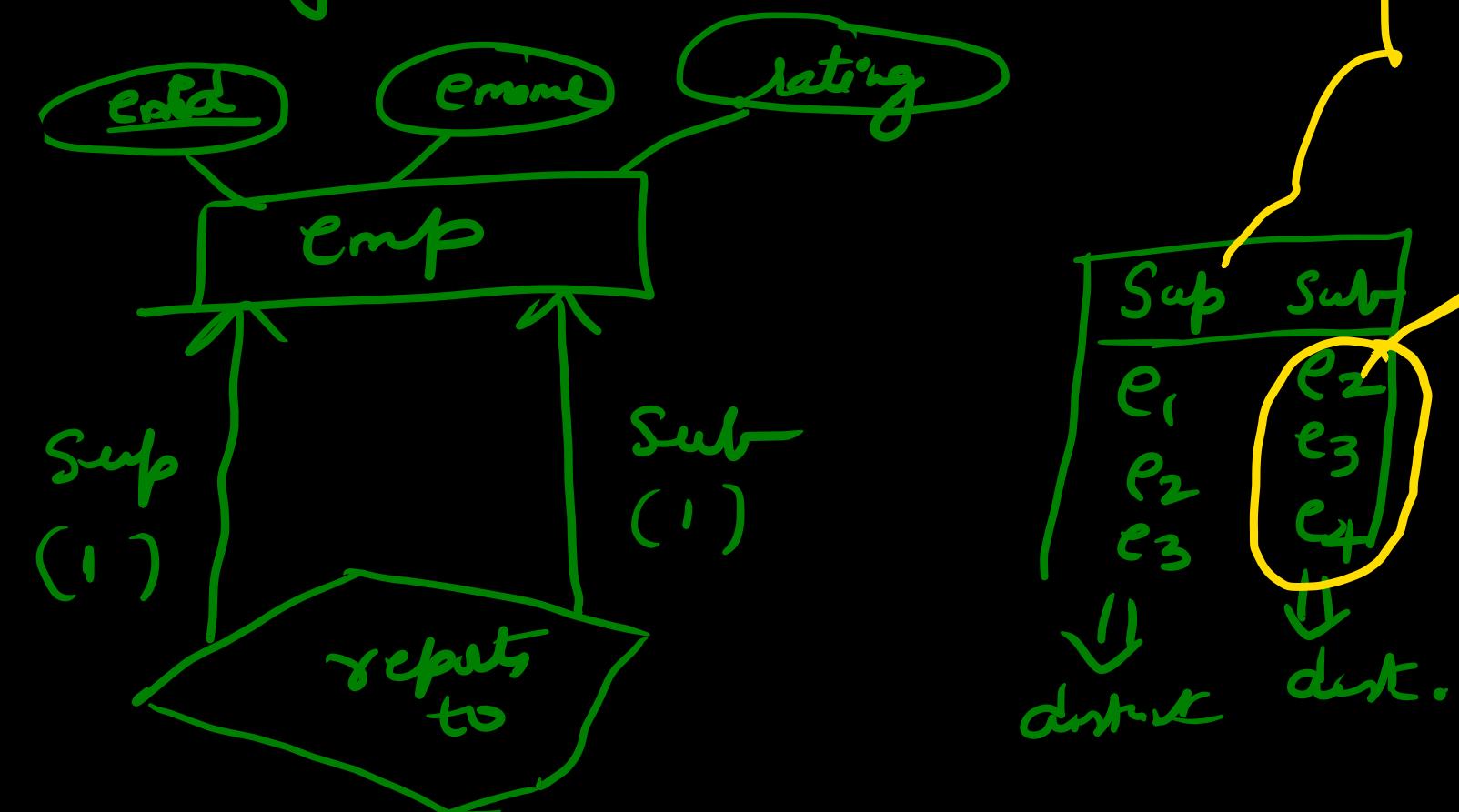
Emp entity set ~~of~~ reports to relationship set related w/o
Supervisor and Subordinate. Each Supervisor can be supervisor
many and SubAdmity and Each subordinate ~~sup~~ reports to Empl





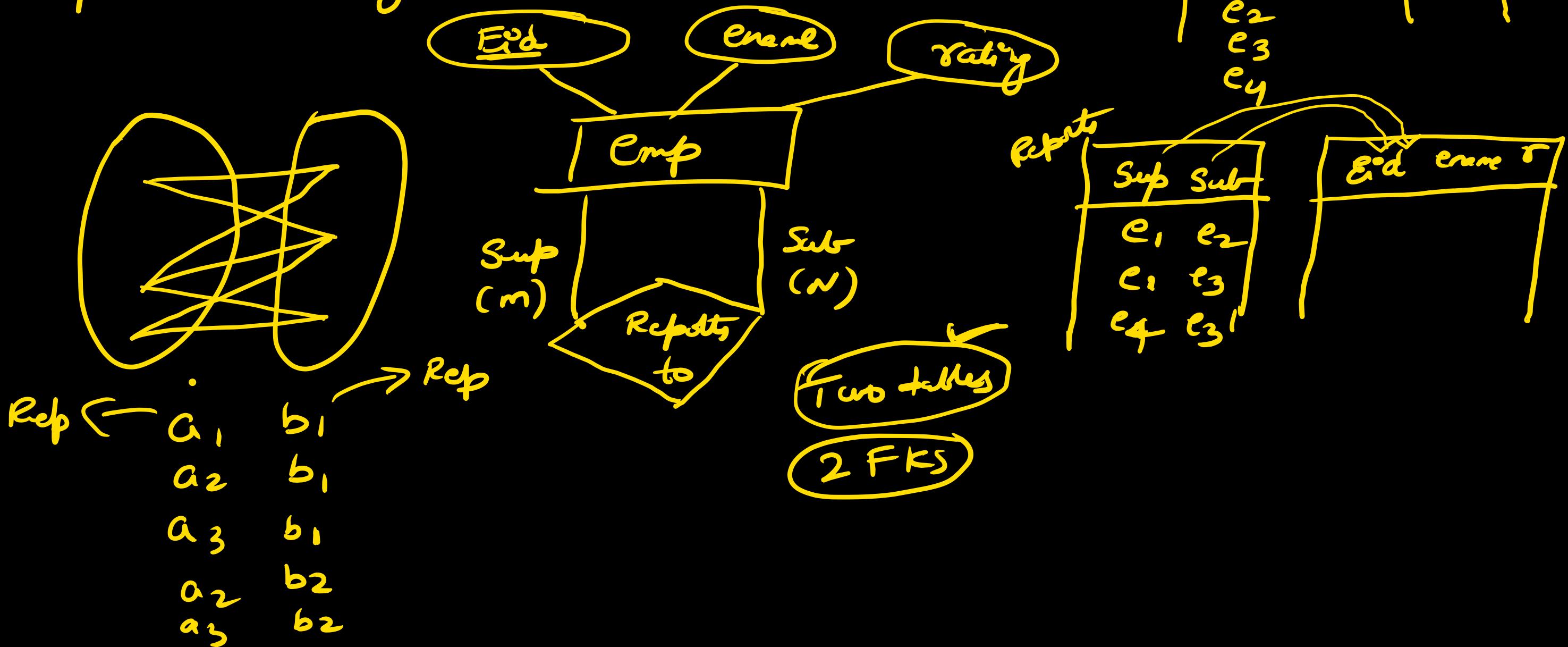
Self referential relationship 1:1

In the above example, each supervisor can supervise one subordinate only.



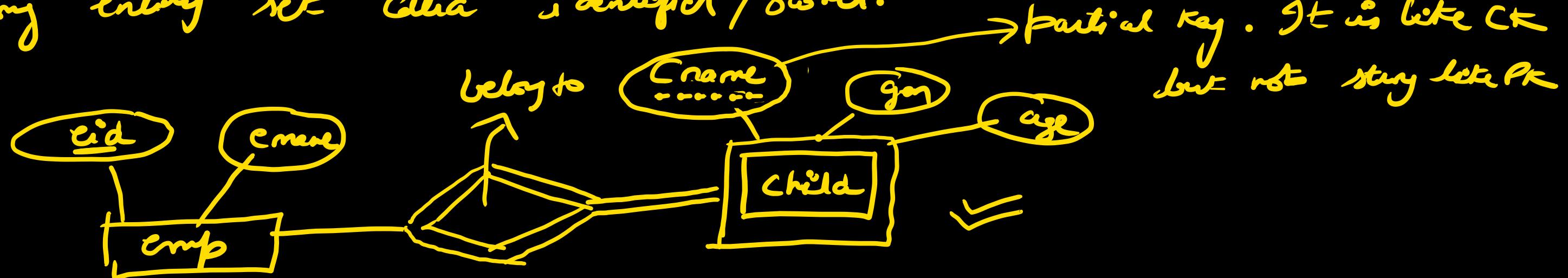
many : many :

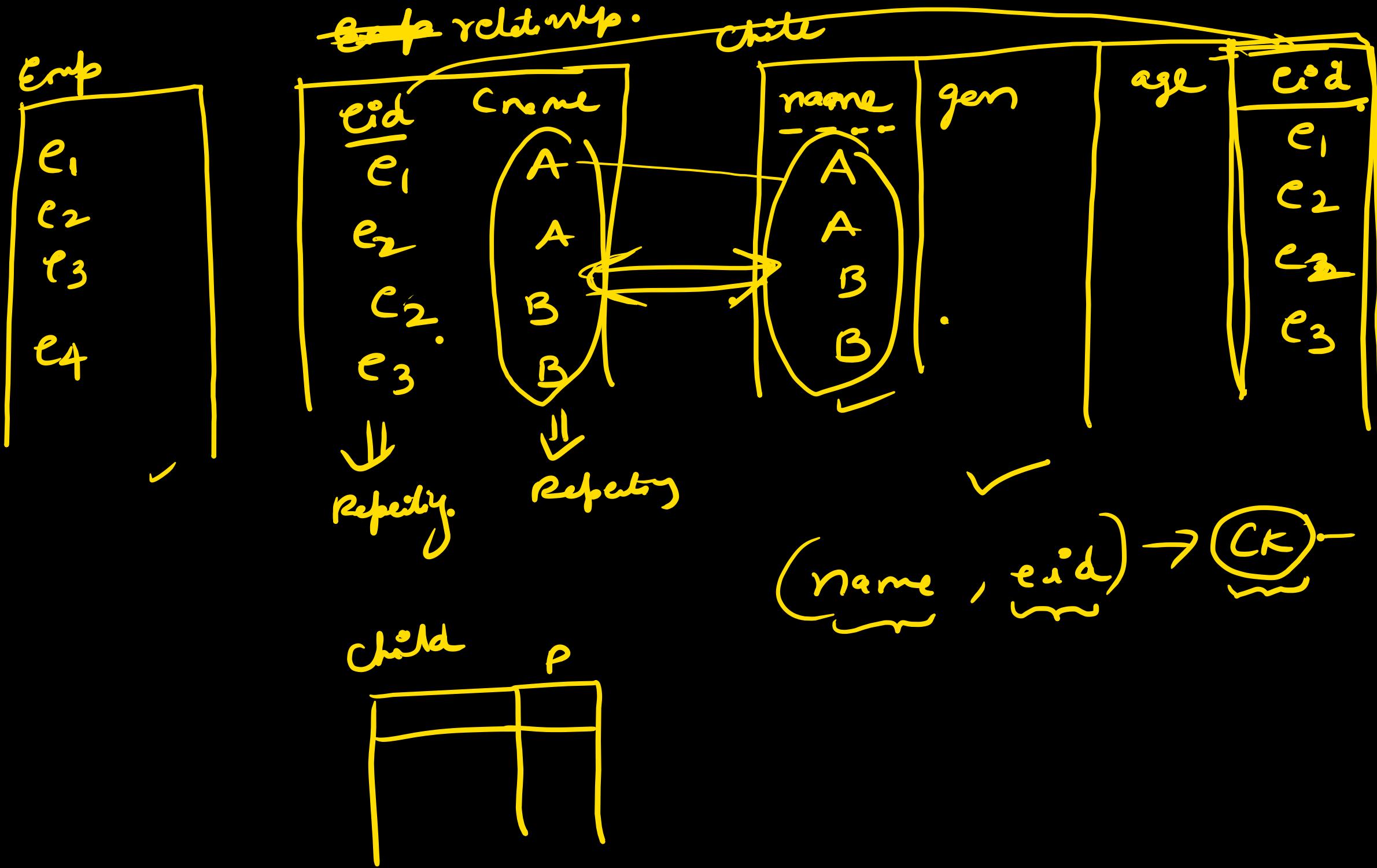
Each supervisor can supervise many subordinates. Each subordinate reports to many supervisors



weak entity set:

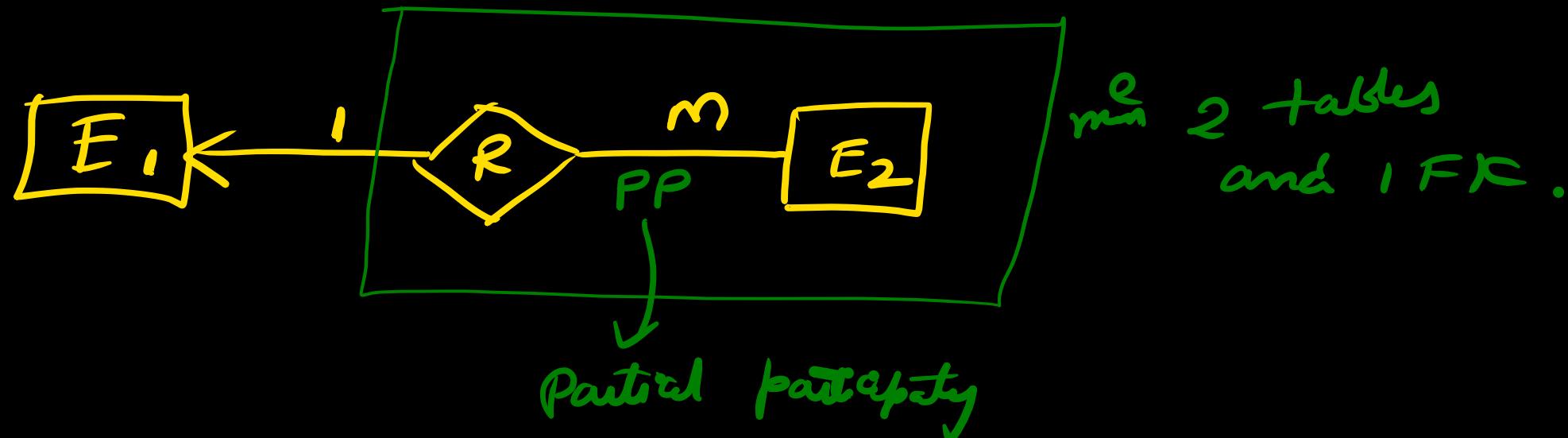
- entity set with no key
- Attributes of weak entity set are ^{not} sufficient to differentiate records uniquely.
- weak entities are depending entities, which ~~other~~ depends on other Strong entity set which identifies / owner.



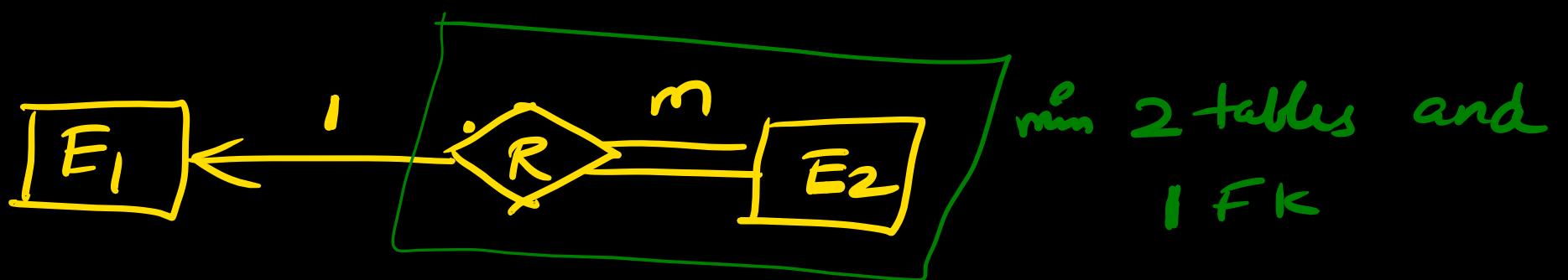


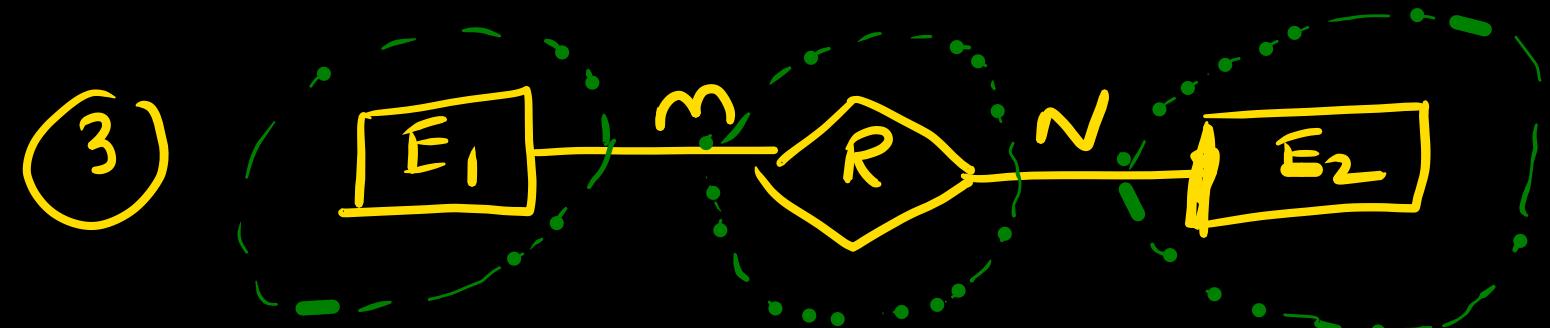
All gate questions models :

①



②





3 RDBMS tables and
and 2 FKs

