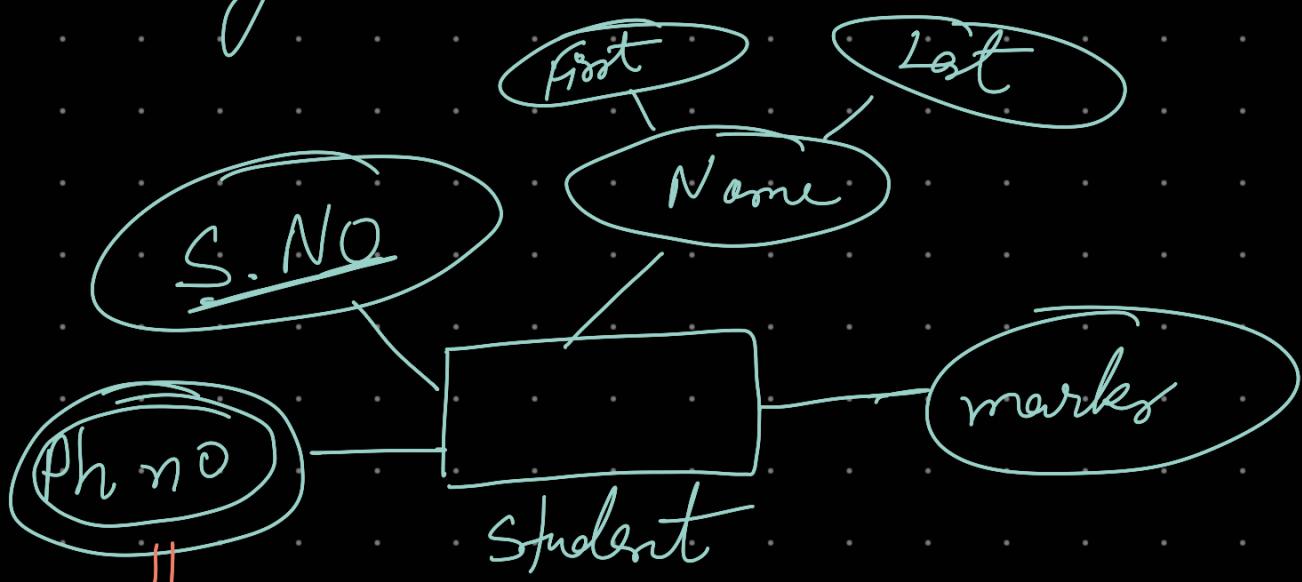


[E-R \longrightarrow Relational Model]

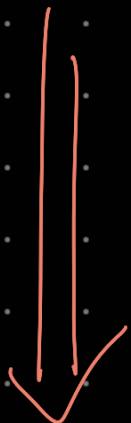
- * E-R model is useful for high level overview to client
 - * ER model is converted into relational model to be used.
1. Converting entities \rightarrow tables
 2. Converting relationships using **foreign keys**
 3. Handling multi-value and composite attribute
 4. **Normalizing tables**
 5. Adding necessary integrity constraints to maintain data accuracy and consistency.

[Step 1]

Entity → table



Multivalue
attribute



S. No	First	Last	marks
-------	-------	------	-------

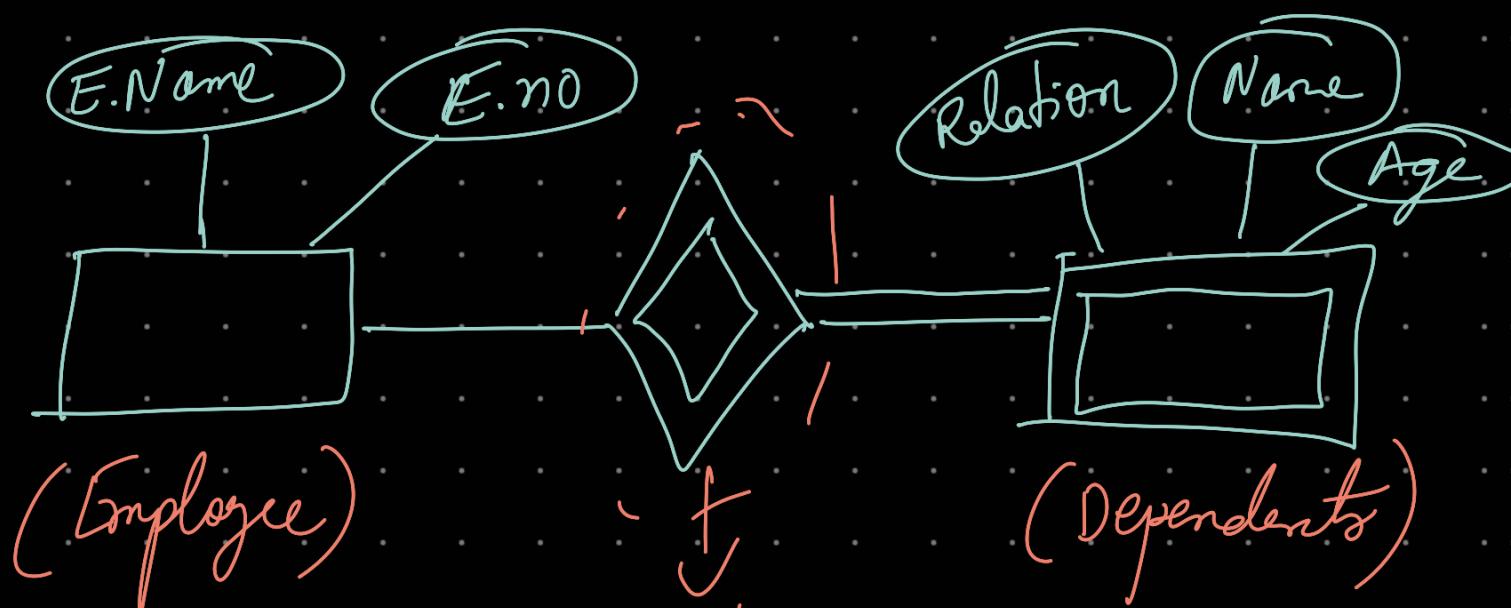
Primary
Key

Composite attribute

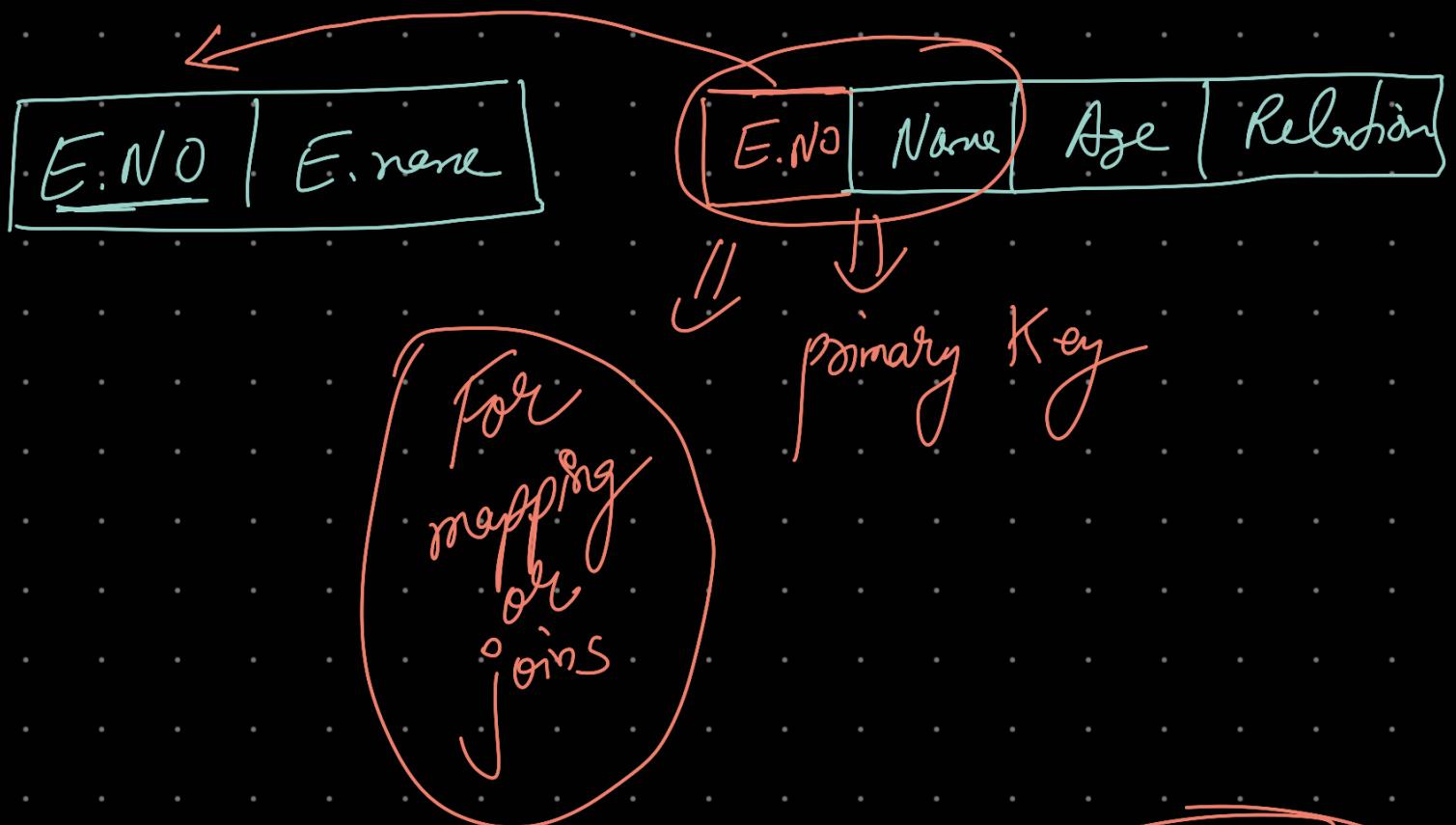
- * Divide composite attribute \rightarrow atomic
- * Don't include Multivalue attribute
- * Represent primary attribute with underline

[Step - 2]

- * Weak entity \rightarrow No primary Key



Identifying
relationship



- * Add primary key to weak entity table
- * Some rules for multivalue and Composite attribute
- * If some row deleted from strong entity table → Use cascade delete

[Step-3]

* Converting Relationships

↳ 1 to 1

↳ 1 to Many / Many to 1

↳ Many to Many

1 to 1 relation

Q1- In which table should we add foreign key?

* In 1-to-1 → each row of one table is related to exactly one row in another table; so foreign key can be added to any table

check which table has
total participation, add there

↓

Why?

partial participation



Total participation

↳ Each row of A is related

B

A

B

C ₁	C ₂	C ₃	C ₄

C ₁	C ₂	C ₃

↓

↙ ↘

Each row will
be full as total
participation

good DB design

A

C1	C2	C3
1		
2		

B

C1	C1	C2	C3
Null			
Null			
1			
2			

Some rows will
have Null values as
partial participation



Bad DB design

Q. What if relation has attribute?

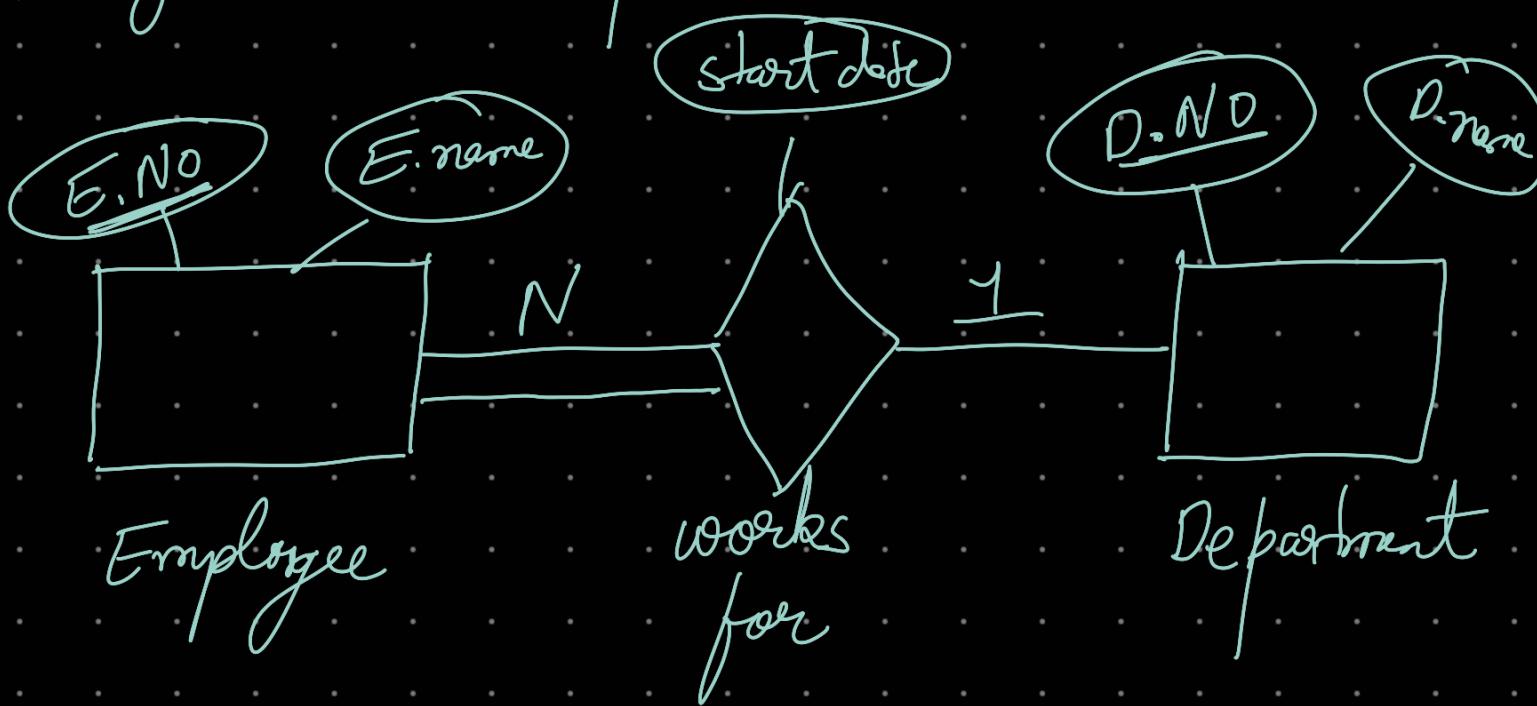
↳ Add it to full participation side

Q. What if both relation is full participation?

↳ Join both table to single table

1 to Many / Many to 1

↳ Logical Interpretation



Adding to 1 side

E.NO	E.name
23	
24	
25	
26	

D.NO	D.name	E.NO
1		23 24
2		25
3		26

This became ↪
 Multivalue attribute
 so can't add on
 1 side

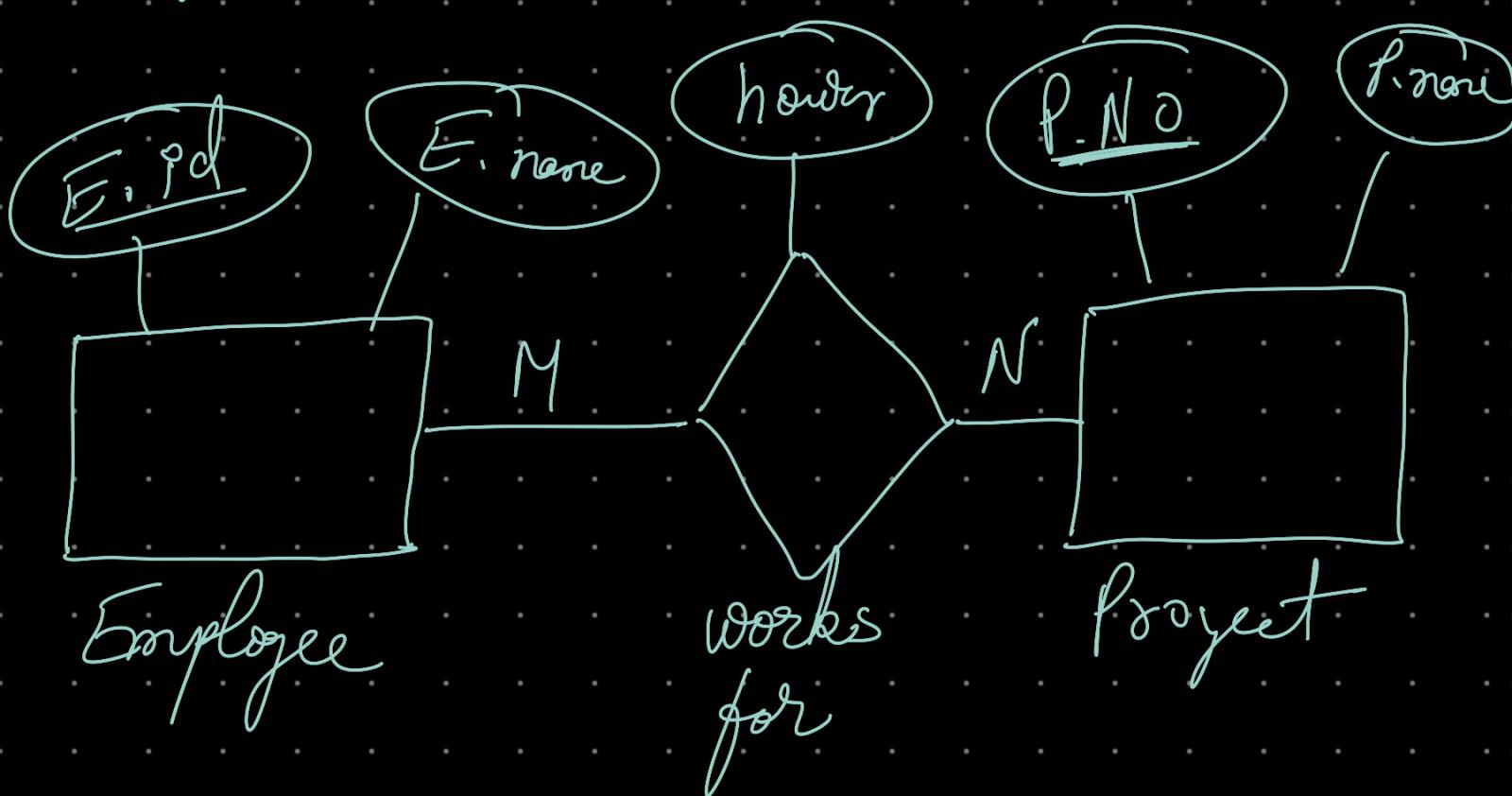
Adding to Many Side

E.NO	Name	D.NO	Start
23		1	
24		1	
25		2	
26		3	

D.NO	Name
1	
2	
3	

- * Makes sense to add P to Many Side
- * Also add attributes of relation

Many to Many



E. No	E. name
1	
2	
3	

P. No	P. name
22	
23	
24	

Can't add on either side
as it will become multivalue
attribute



Create new table

Add attribute
here

E.NO	L.NO	hour
1	22	
2	22	
3	23	

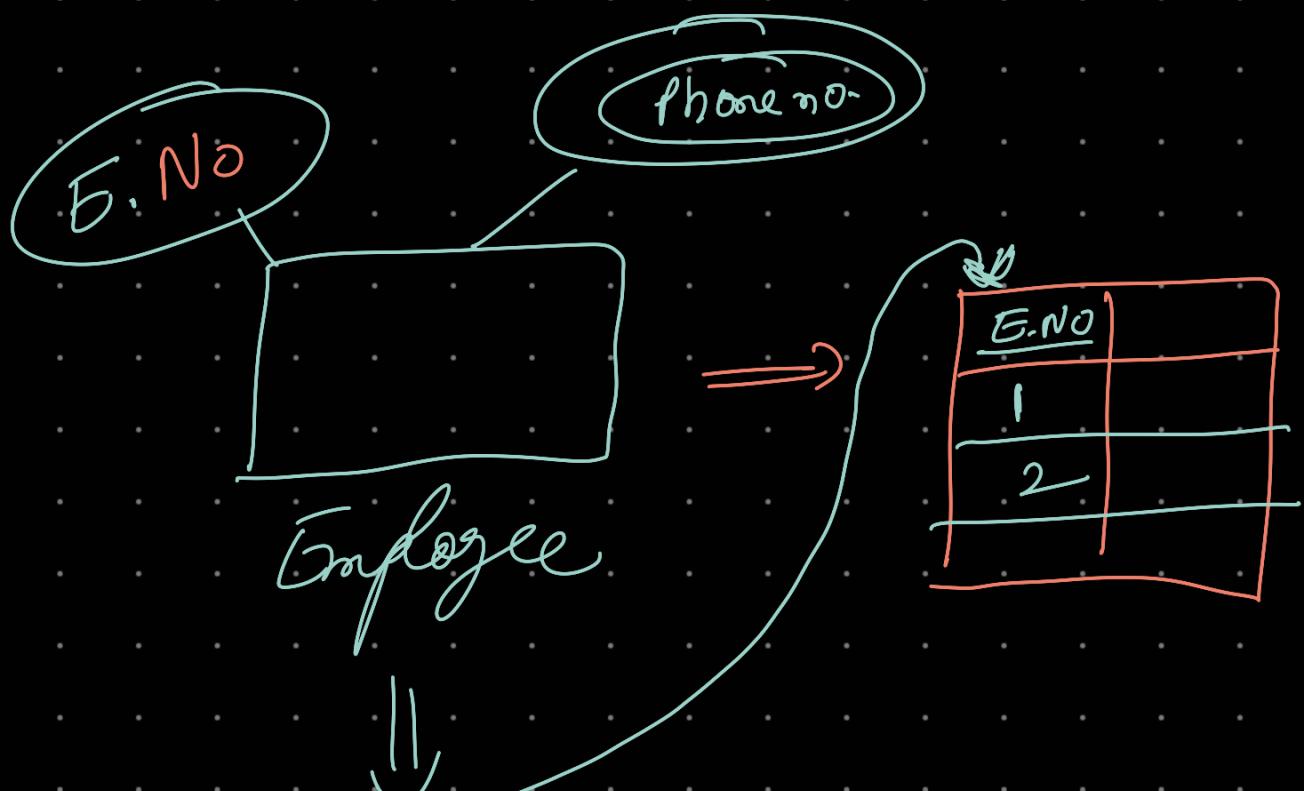
→ primary Key → Combination of both

Step - 4

* Dealing with Multivalued attributes



Create new table

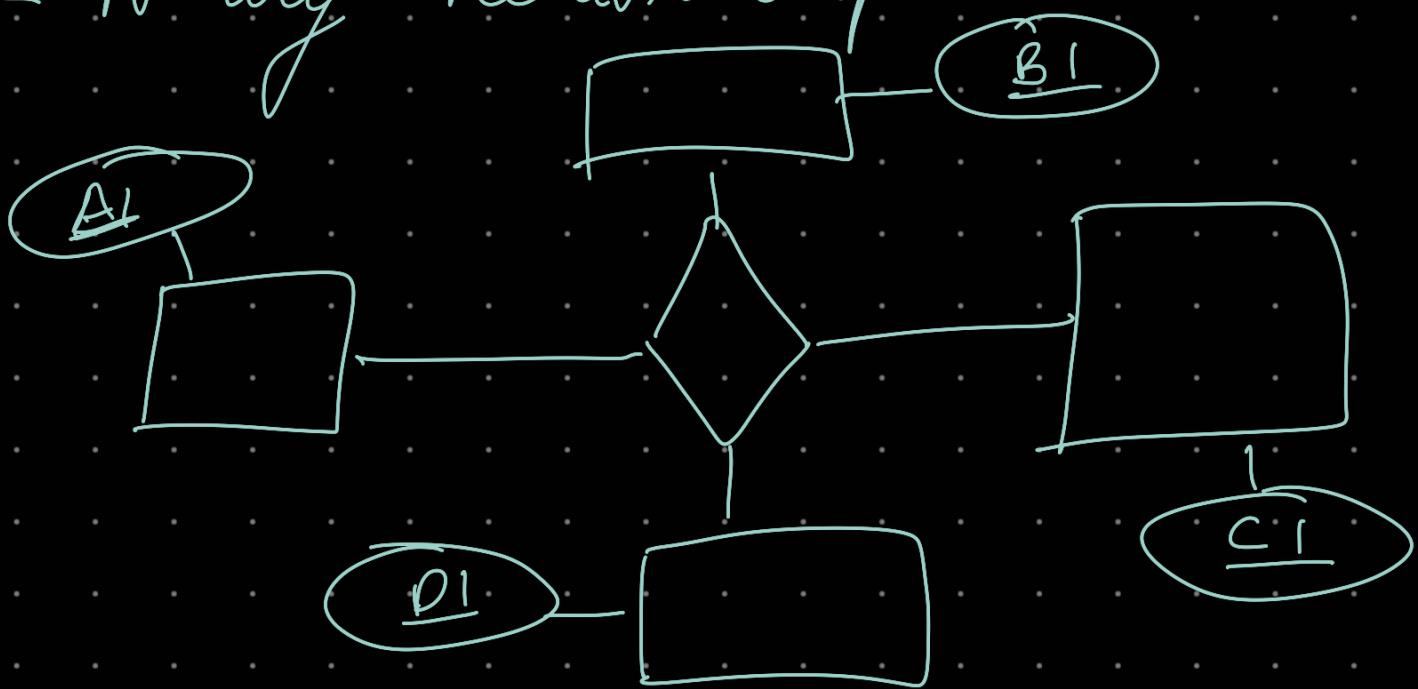


Primary Key

E. No	p. No
1	1234
1	2356
2	3456

Step - 5

* N-ary Relationship

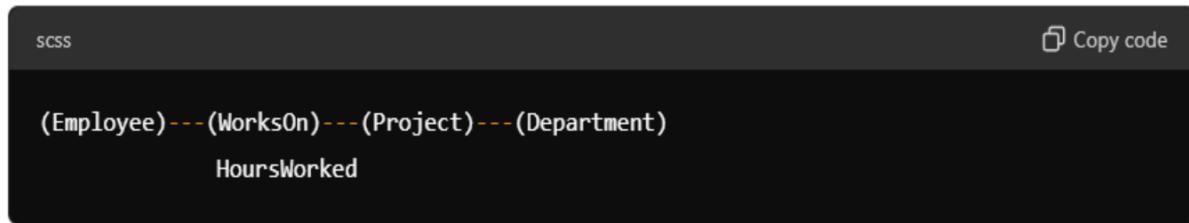


- * Create New table with primary keys of each entity as columns
- * Add attributes of relation

A1	B1	C1	D1

primary Key
~~—————~~

ER Diagram:



SQL Implementation:

sql

Copy code

```
CREATE TABLE Employee (
    EmployeeID INT PRIMARY KEY,
    Name VARCHAR(100)
);

CREATE TABLE Project (
    ProjectID INT PRIMARY KEY,
    ProjectName VARCHAR(100)
);

CREATE TABLE Department (
    DepartmentID INT PRIMARY KEY,
    DepartmentName VARCHAR(100)
);

CREATE TABLE WorksOn (
    EmployeeID INT,
    ProjectID INT,
    DepartmentID INT,
    HoursWorked INT,
    PRIMARY KEY (EmployeeID, ProjectID, DepartmentID),
    FOREIGN KEY (EmployeeID) REFERENCES Employee(EmployeeID),
    FOREIGN KEY (ProjectID) REFERENCES Project(ProjectID),
    FOREIGN KEY (DepartmentID) REFERENCES Department(DepartmentID)
);
```