

Database Design (bottom-up)

1. For each entity type create a separate table
For each attribute of the entity type
create a column in the table
Identify primary key for the table
2. Examine all relationships:
 - a) 1:1 It needs to be represented as part of one of the entity types.
(preferably with total participation).
 - b) 1:n It needs to be represented as part of the table corresponding to the many. side of the relationship.
 - c) m:n The relationship has to be stored as a separate table.

For each table, identify the primary key.

Foreign key constraints need to be defined for columns that represent relationship semantics.

ER - to - Relational DB

- ① Create a table for each entity type
- For every ^{simple} attribute of the entity type, add a column to the table.

② Relationships:

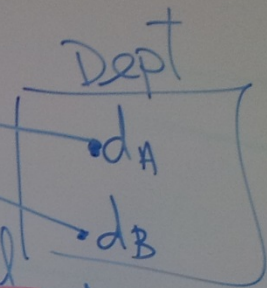
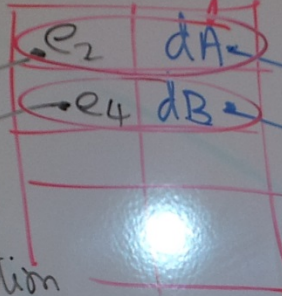
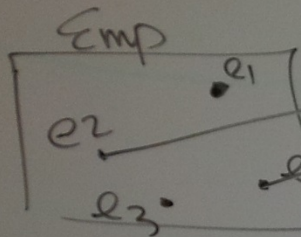
1:1 Represent the relationship as column(s) in either table of the entity types participate in the relationship. Prefer entity type with total participation.

Employee

SSN
e ₁
e ₂
e ₃
e ₄

Logical View of Relationship

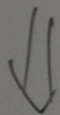
1:1
Managers



Partial Participation

Total Participation

Employee



SSN	Fname	Minit	Lname	...	DNo
e1	John		Smith	...	—
e2				...	dA
e3				...	—
e4				...	dB

(i) Managers

(i) Managers as part of Employee

(ii) Managers as part of Dept

(iii) Managers as a separate table
Slows down Query Processing.

(ii)

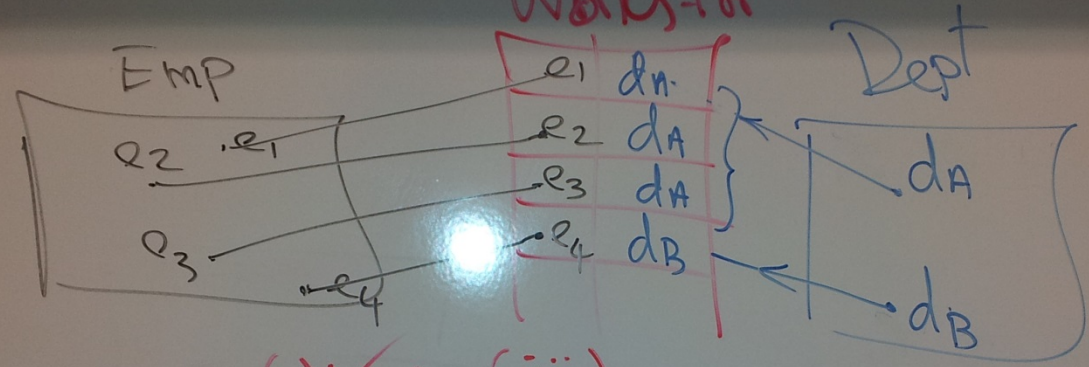
Dept

DNo	DName	...	Mgr SSN
dA	Marketing		e2
dB	Research		e4

ship.

ion.

N:1
WORKS-FOR



EMP

SSN	Fname
e1	
e2	
e3	
e4	

(i) ✓

DWR

dA
dA
dA
dB

X (iii)

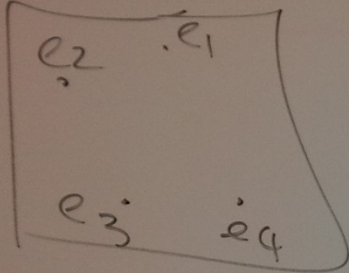
e1	dA
e2	dA
e3	dA
e4	dB

Dept

DNr			
dA			e1, e2, e3
dB			e4

(ii) X

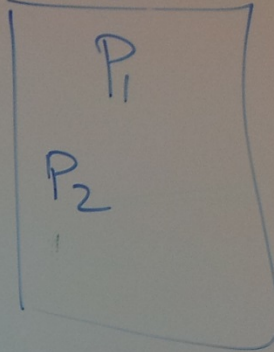
Emp



M:N
Works-on

e1	P1
e1	P2
e2	P1
e3	P1
e4	P1
e4	P2

Proj



Emp

SSN	...	PWO
e1		P1, P2 ✗
e2		P1
e3		P1
e4		P1, P2 ✓

(i) ✗

(iii) ✓

Proj

Proj	EWO
P1	e1, e2, e3, e4 ✗
P2	e1, e4 ✓

(ii) ✗

1:N Relationship

Represent the relationship as column(s) in the table (entity type) corresponding to the "N" role.
(many)

Emp

e ₂
e ₃

M:N Relationship

Represent it as a separate table with primary keys of the participating entity types.

Emp

SSN	...
e ₁	
e ₂	
e ₃	
e ₄	

For all tables

- Specify Primary key constraint

- For each referencing column(s) in a table,
Specify a Foreign key constraint

- For attributes that require only a specific set of values,
Specify a Check constraint (Legal-values)
e.g. Sex IN ('M', 'F')

Emp

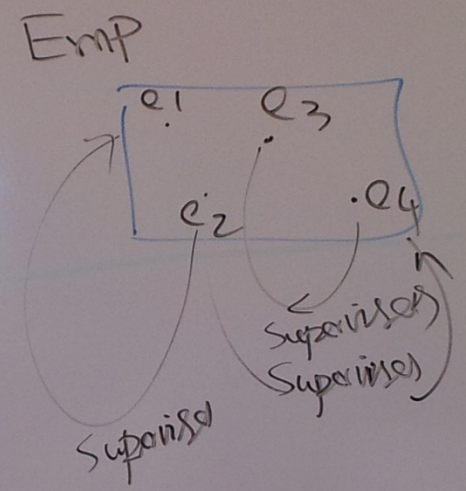
SSN	...	S
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nt

mn(s) in a table,
constraint

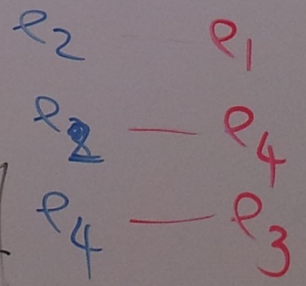
only a specific set of values,
constraint (legal-values)

Reflexive relationship



Supervision

Supervisor Subordinate



Emp

SSN	...	Super SSN