Entity Relationship Diagram

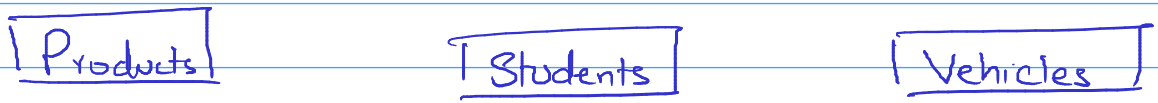
ERD
ER Diagram

Entity

Class in OOP (nouns)

when you need to track multiple instances of same type

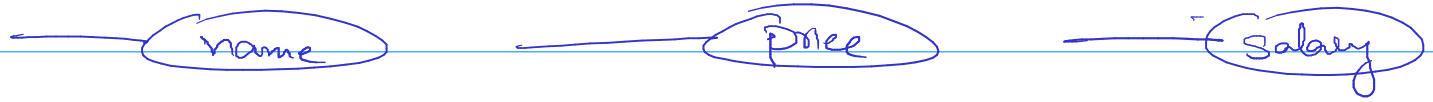
Represented using a rectangle



Attributes

Properties of the entities to be tracked

Represented using balloons/ovals connected to the entity



Dependents

DII Super Store

Category

Employee

Vehicle

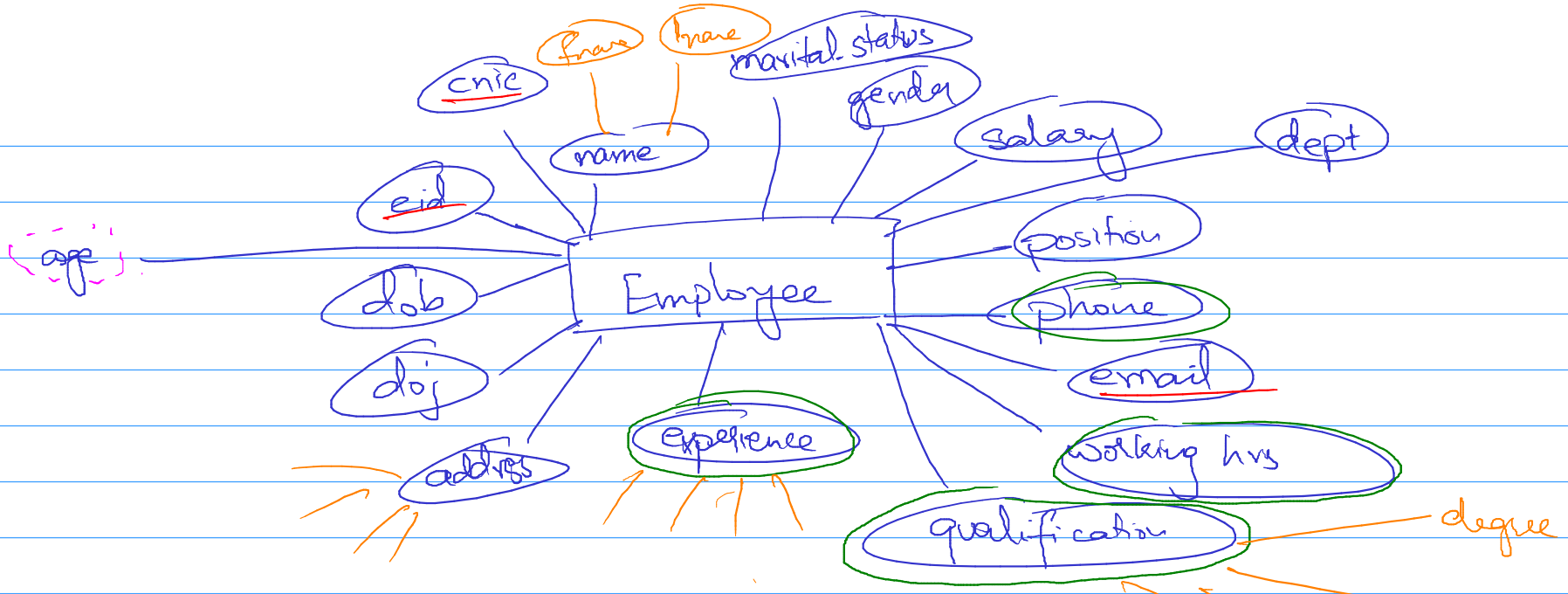
Products

order

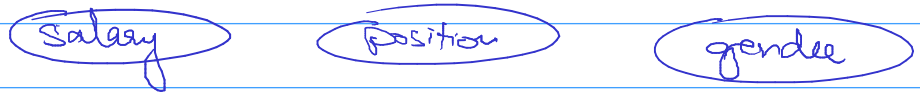
Customer

Supplier

Shipper



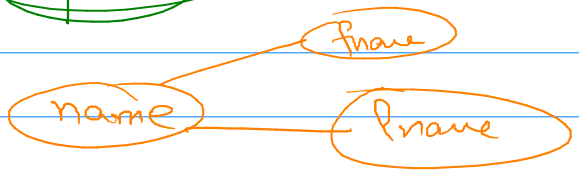
Regular Attributes

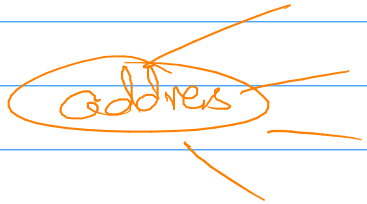


Unique Attributes

Multivalued Attributes

Complex Attributes

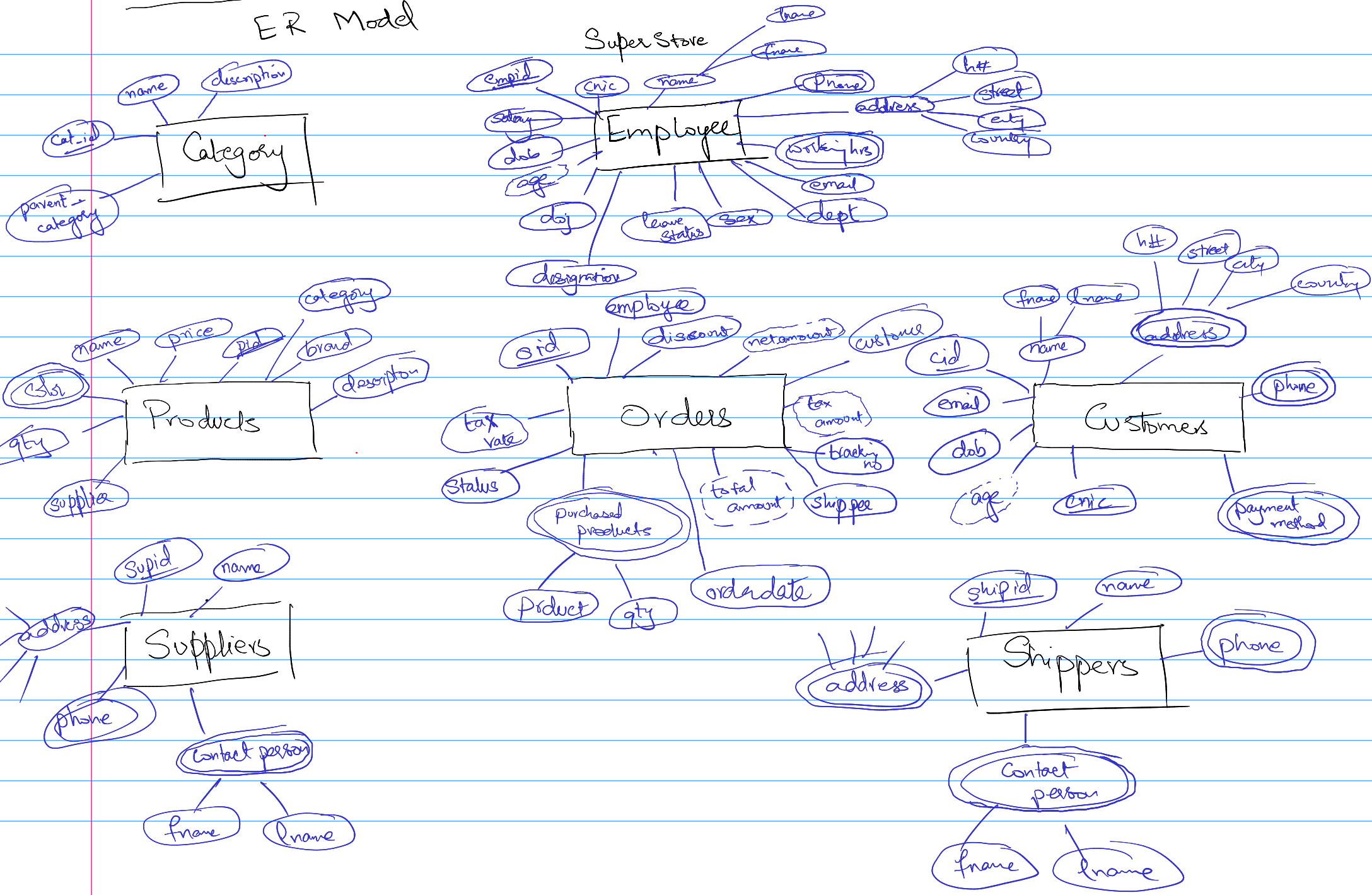




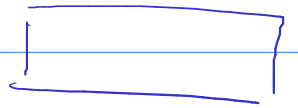
Derived Attributes

Entity Relationship Model

ER Model



Entity



Strong Entity

Weak Entity

An entity which does not have any unique attribute

Attributes

Composite Unique

Normal Attribute

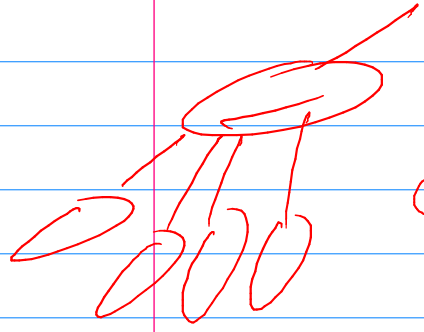
Unique Attribute

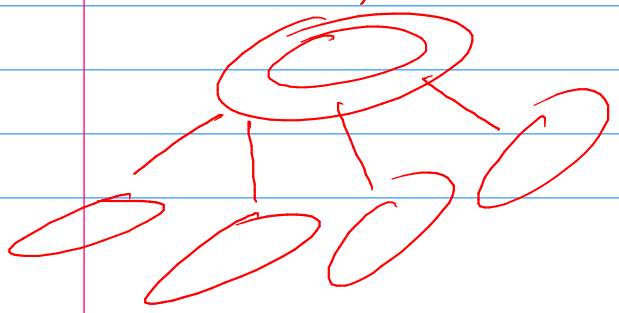
Composite Multivalued Attribute

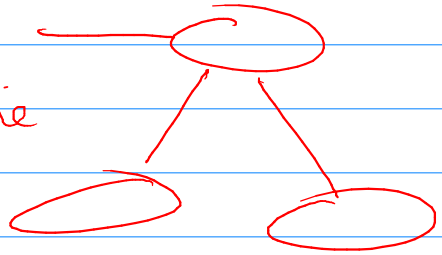
Composite Attribute

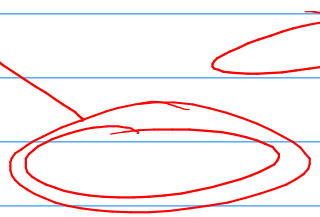
Multivalued Attribute

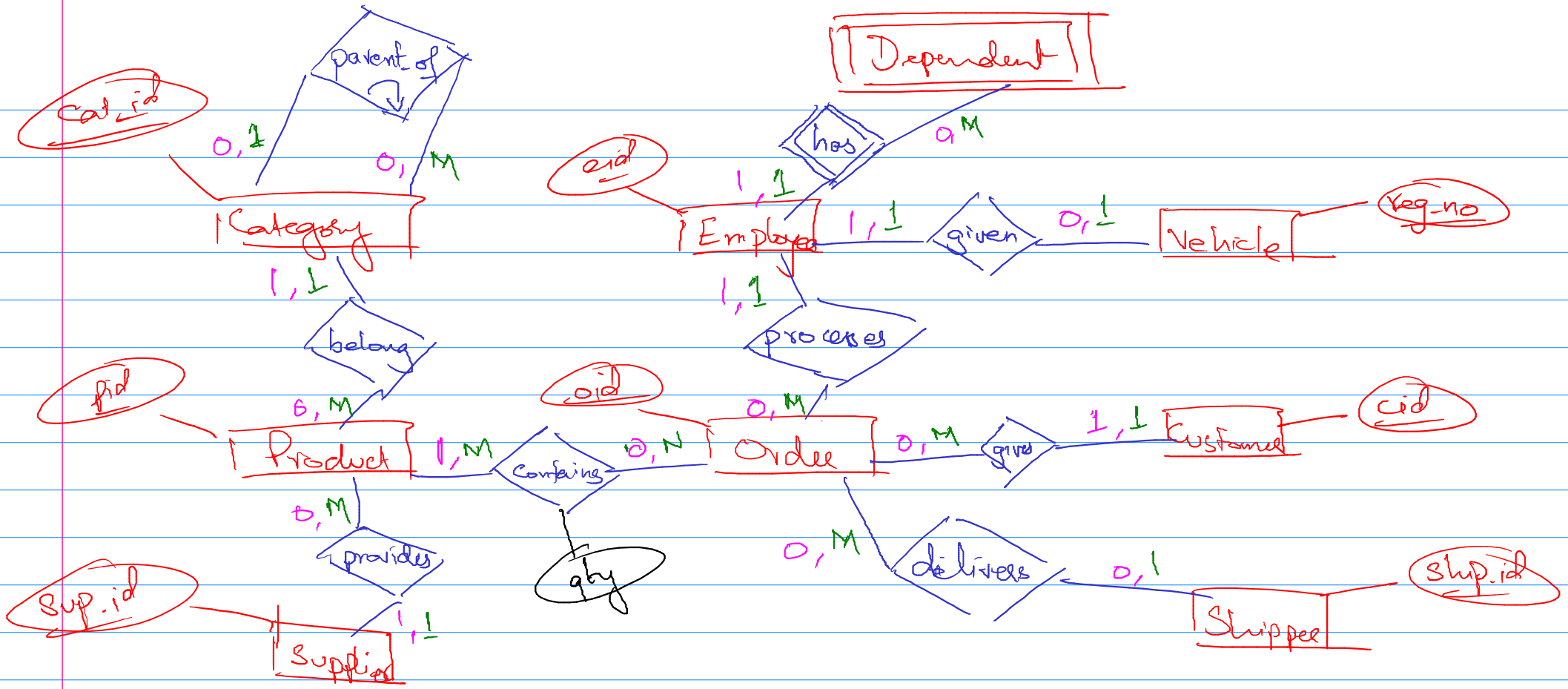
Derived Attributes











Cardanility

1,M

1-1 One to One

1-M/M-1 One to Many / Many to one

M-N Many to Many

Participation

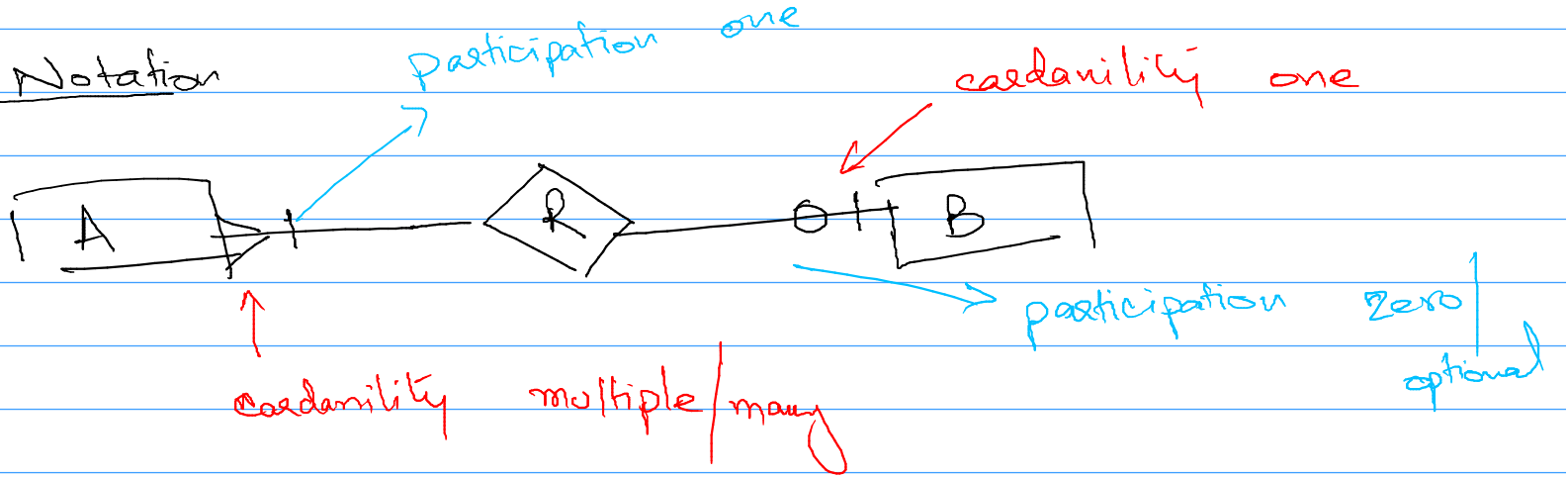
0,1 Minimum possible value

0-0 Optional on both sides

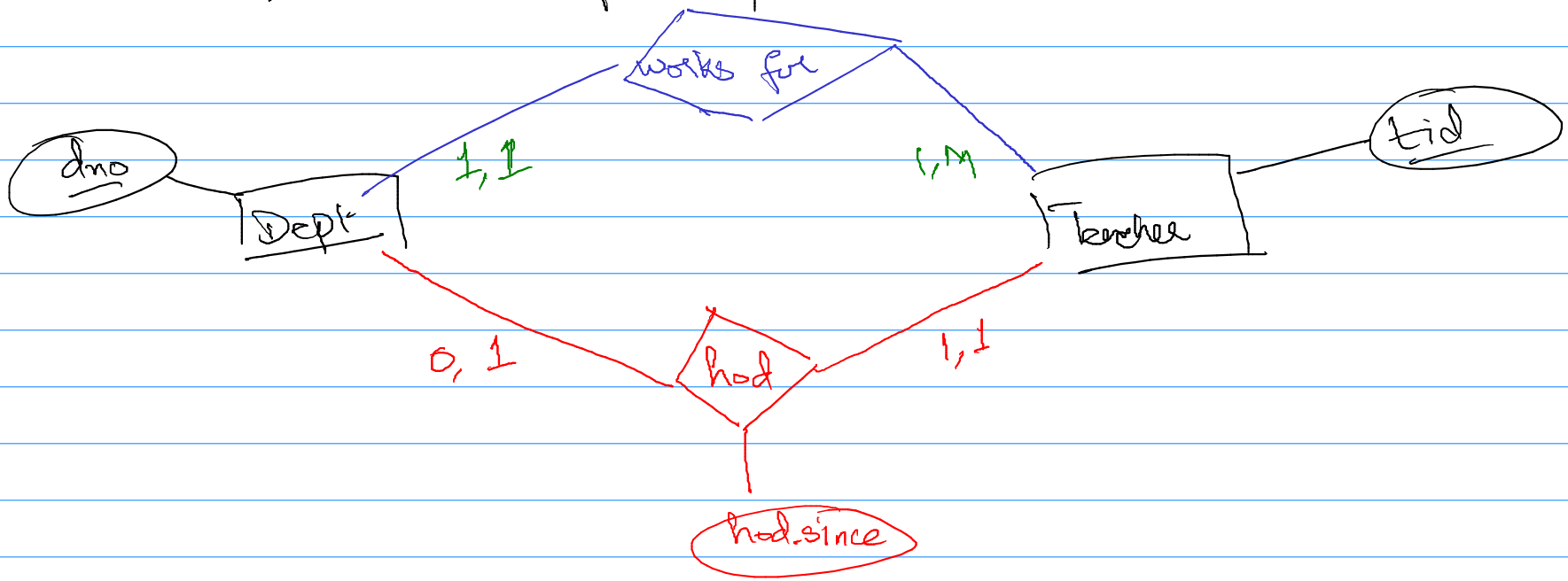
1-0/0-1 optional on one side & required on other

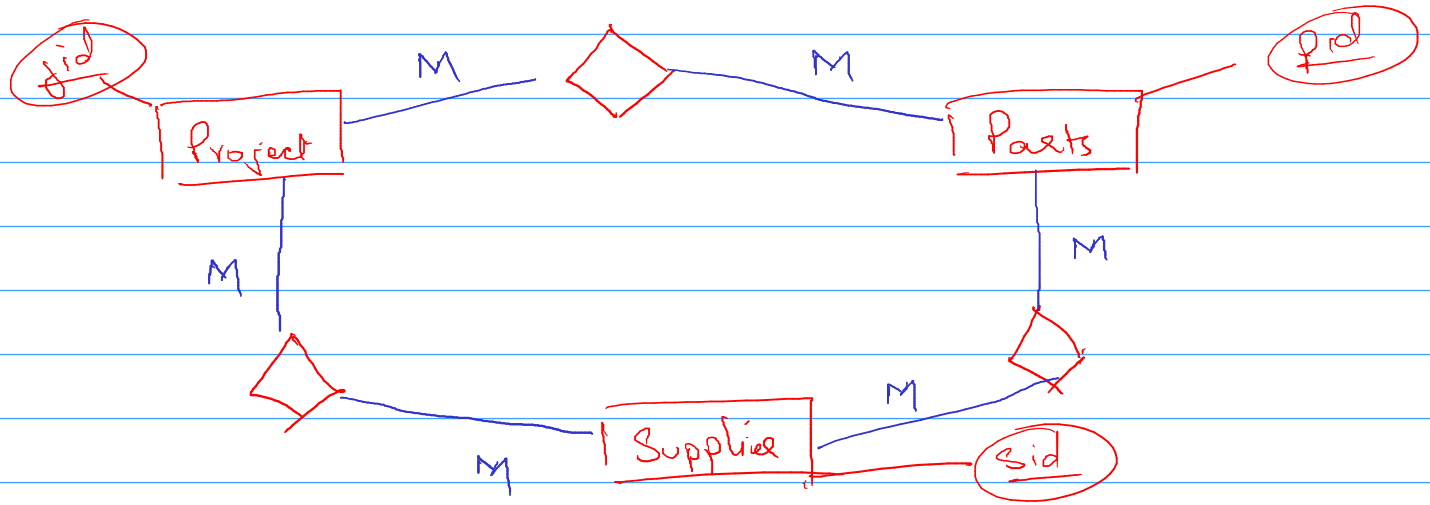
1-1 required on both sides

Crowfoot Notation



More than 1 relationship b/w same entities





Ternary Relationship

Any relationship that connects more than 2 entities

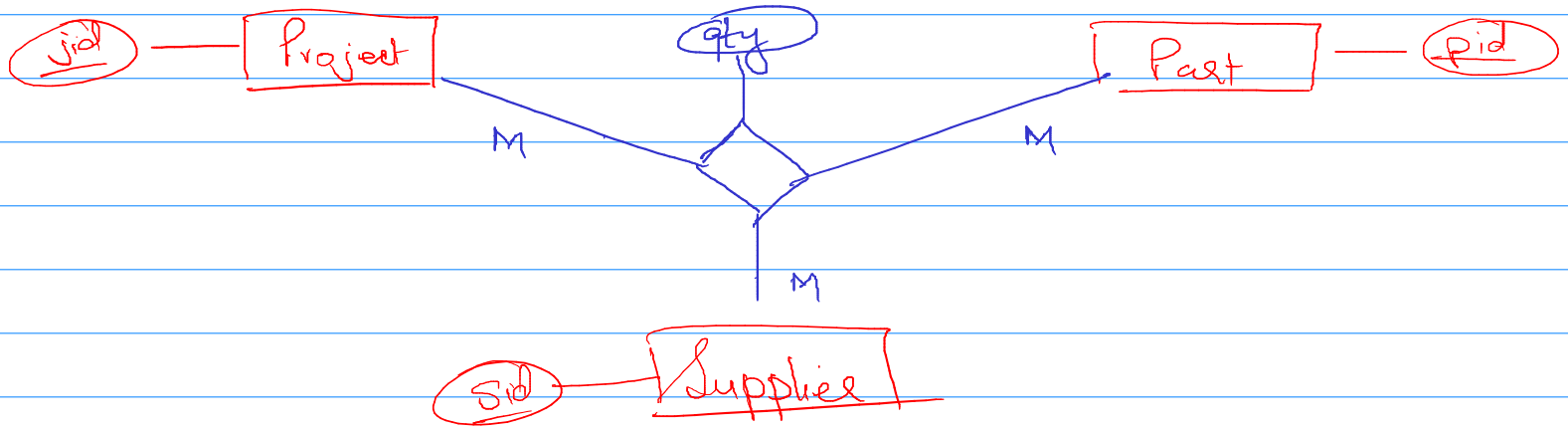


Table Design Guidelines

1. Multivalued columns in any table are NOT allowed in any circumstance
2. Avoid NULL values in the table

ERD to Relational Schema Conversion / Translation / Reduction

1. Handle the Entities (Strong & Weak Entity)
   Make a table for each entity

2. Handle the attributes
   a. Regular Attributes → Add them to the table
   b. Unique Attributes → Make one of the attributes as PK, rest are regular attributes with unique constraint
   c. Complex Attributes → Connect all the branches directly to the entity. Original complex attribute becomes derived attribute
   d. Multivalued Attributes → Add a new Weak Entity in the system, connected to current Strong entity by an identifying relationship
      Move the multivalued attribute as a regular attribute in this weak entity
   e. Derived Attribute → Remove them from the system

3. Handle Relationships

look at cardinality of relationship

a. 1 — 1

look at the participation

(i) o — o

ii) 1 — o / o — 1

iii) 1 — 1

Weak Entity will always have a composite PK

FK coming in the weak entity from across the identifying relationship will always be part of the PK

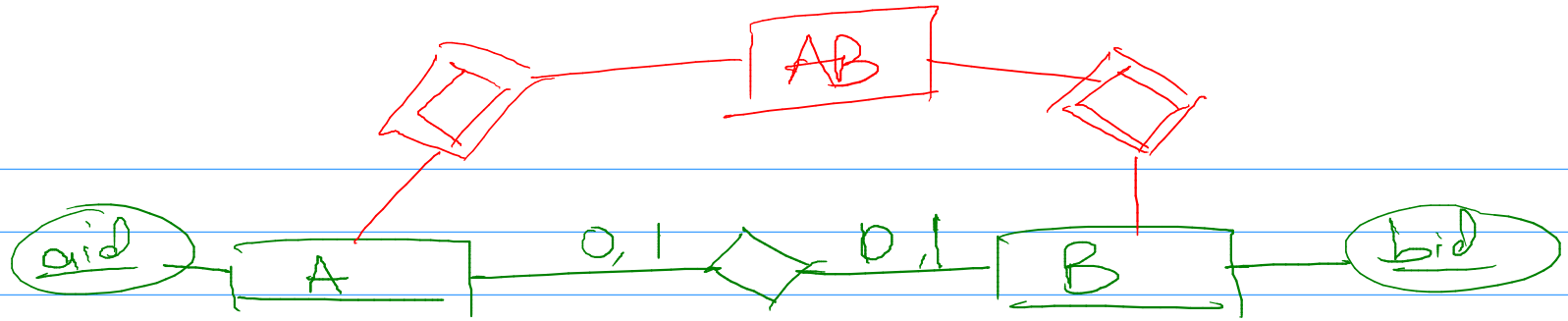
b. 1 — M

Take PK of table on 1 side and make it FK on M side

c. M — M

Make a new weak entity connected to both entites with 2 identifing relationships

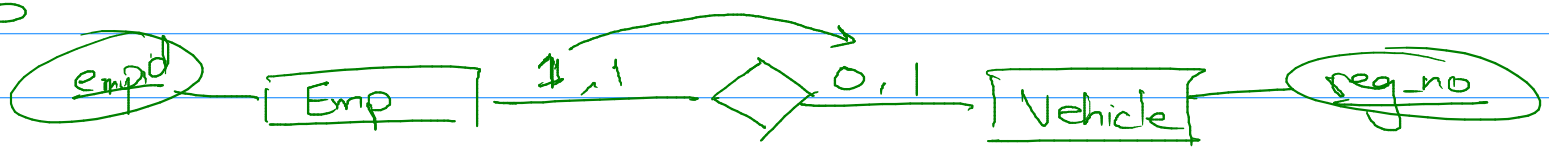
i) 0 — 0



technique 1 : Make any Pk as Fk in other table as NULL values are unavoidable

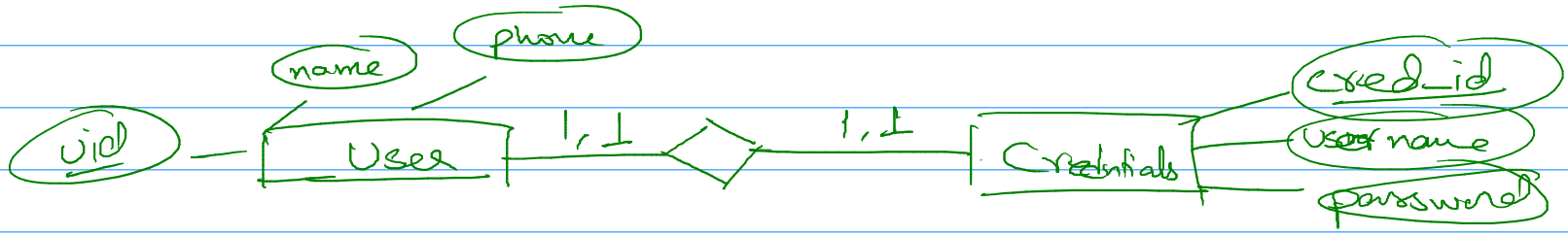
technique 2 : Make a join table for entities A & B

ii) 1 — 0

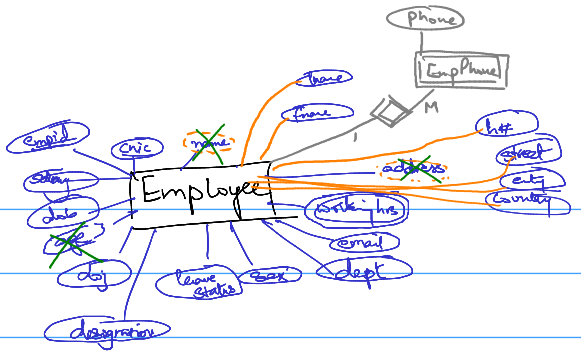


Take Pk of 1 side and make it Fk on 0 side

iii) 1 — 1



Merge the two tables.



EmpPhone
- phone
- empid

Emp Dependents
- dep_name
- empid

Category
- cat_id
- parent_cat_id

Employee
- salary - dob
- doj - designation
- sex - dept
- empid, - cnic
- email, - fname,
- lname, - hno
- street, - city
- country

Vehicle
- reg_no
- emp_id

Product
- pid
- cat_id
- sup_id

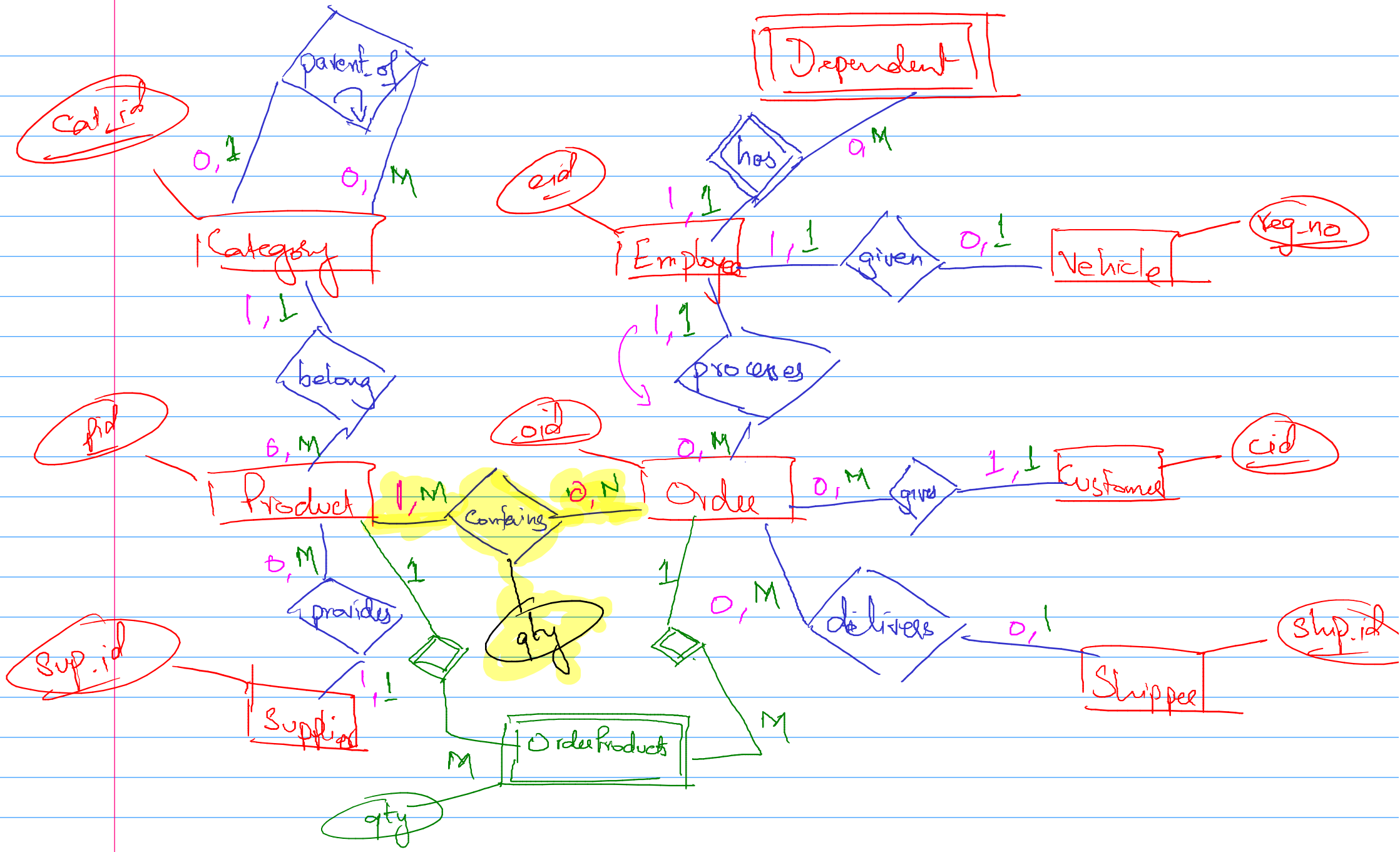
orderProds
- qty
- oid
pid

Order
+ oid
- cid
- emp_id
- ship_id

Customer
- cid

Supplier
- sup_id

Shipper
ship_id


parent_of
Cat_id
0,1
0,M
Category
1,1
belong
6,M
Product
Dependent
has
0,M
aid
1,1
Employee
1,1
given
0,1
Vehicle
Reg-no
1,1
processes
oid
0,M
Order
1,M
Contains
0,N
0,M
gives
1,1
Customer
cid
pid
0,M
provides
1
qty
1
0,M
delivers
0,1
Shipper
Shp.id
Sup.id
1,1
Supplier
M
OrderProducts
M
qty

1. How to handle multiple &relationships b/w 2 entities

2. How to handle tenary / n-ary relationships