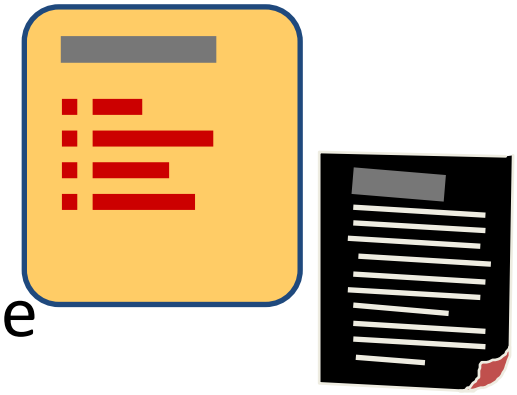
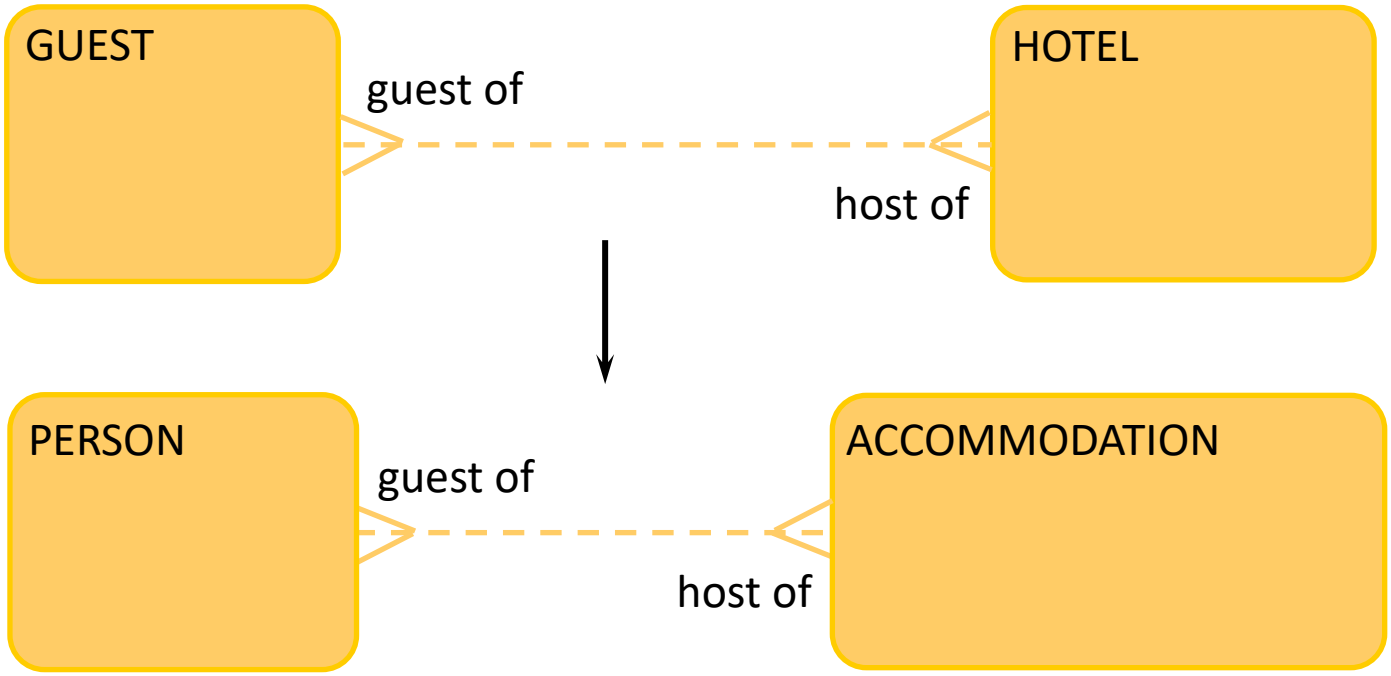
Entities

- Give the entity a unique name
- Create a formal description of the entity
- Add a few attributes, if possible
- Be aware of homonyms
- Check entity names and descriptions regularly
- Avoid use of reserved words
- Remove relationship name from entity name



Relationship Name in Entity Name

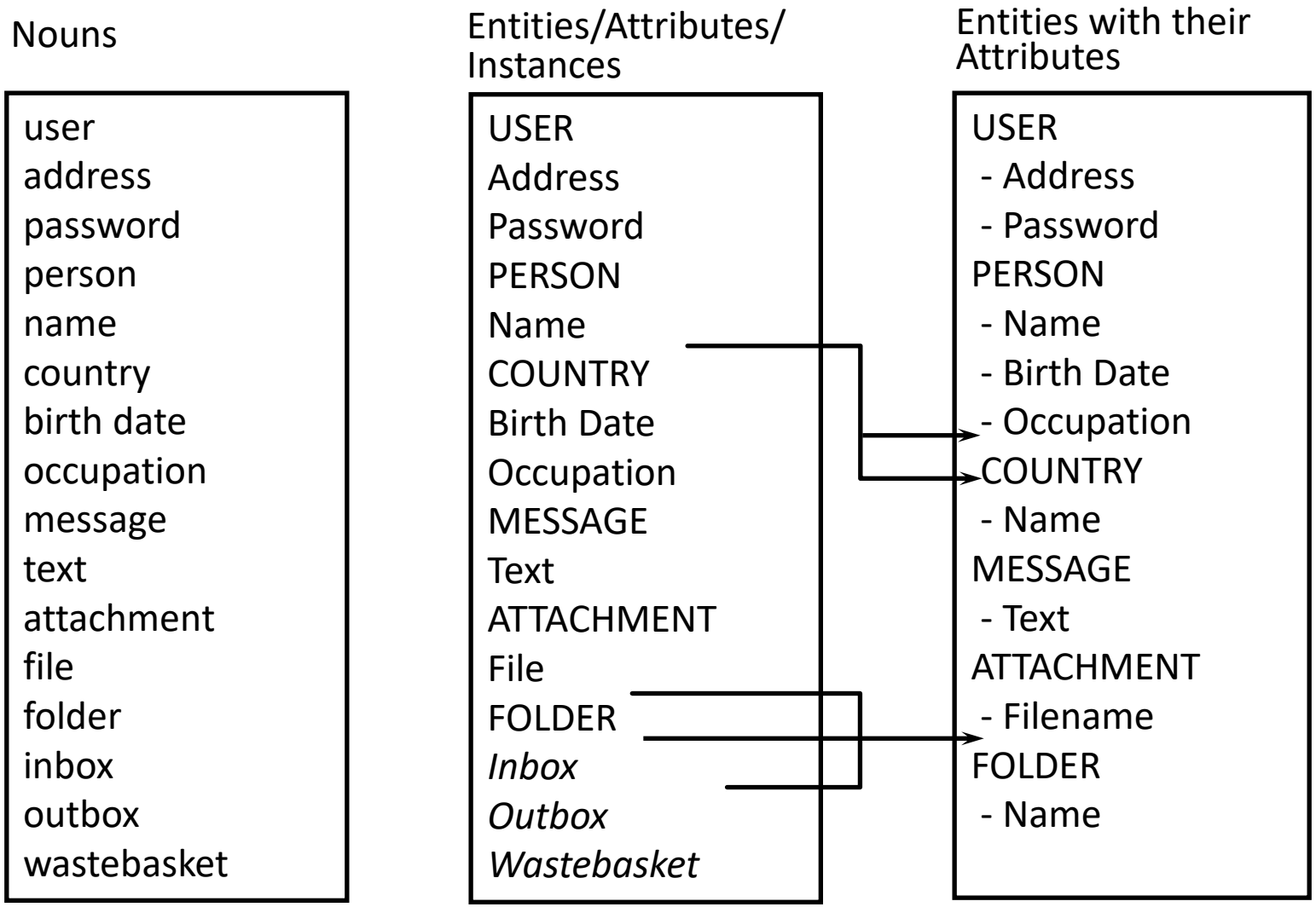


The second model is more general in its naming. It allows the addition of a second relationship between the same entities.

An Attribute...

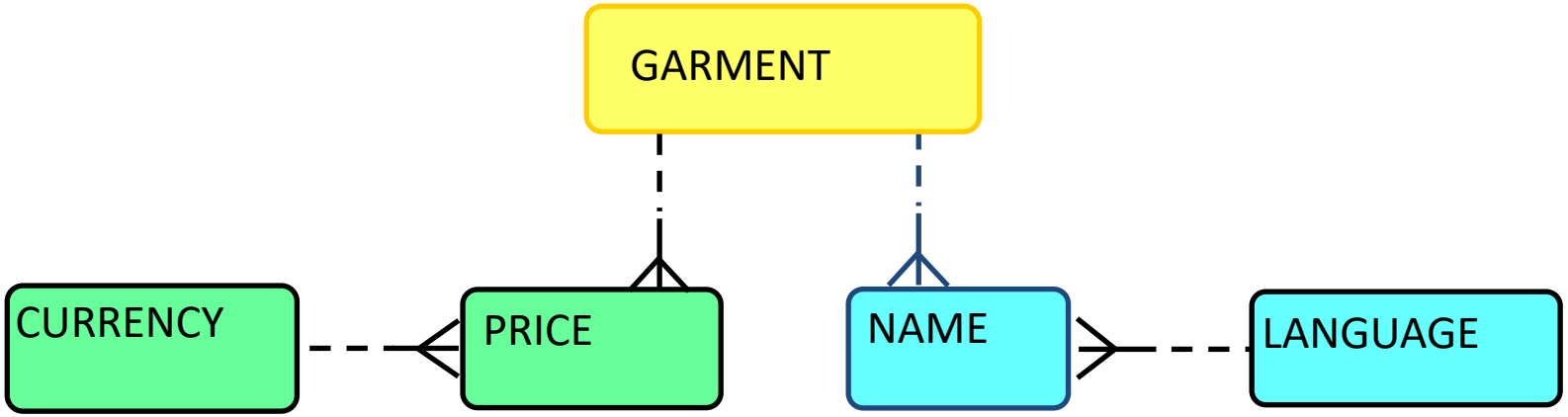
- Always answers “of what?”
- Is the property of entity, not of relationship
- Must be single valued
- Has format, for example:
  - Character string
  - Number
  - Date
  - Picture
  - Sound
- Is an elementary piece of data

EM Entities and Attributes



Attribute and Entity

- Attributes in one model can be entities in another.



Redundancy

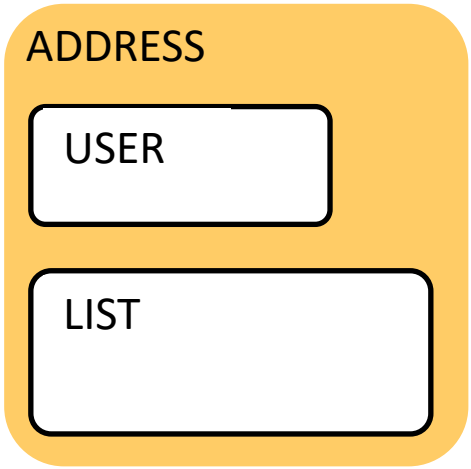
COMMODITY
* Name
* Price exclusive VAT
* Price inclusive VAT
* VAT %

Prevent using redundant attributes.

A Subtype …

- Inherits all attributes of supertype
- Inherits all relationships of supertype
- Usually has its own attributes or relationships or business functions
- Is drawn within supertype
- Never exists alone
- May have subtypes of its own
- Is also known as “Subentity”

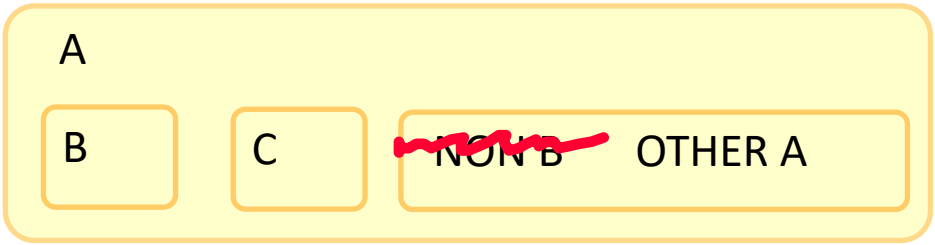
(Address means mail address here.)



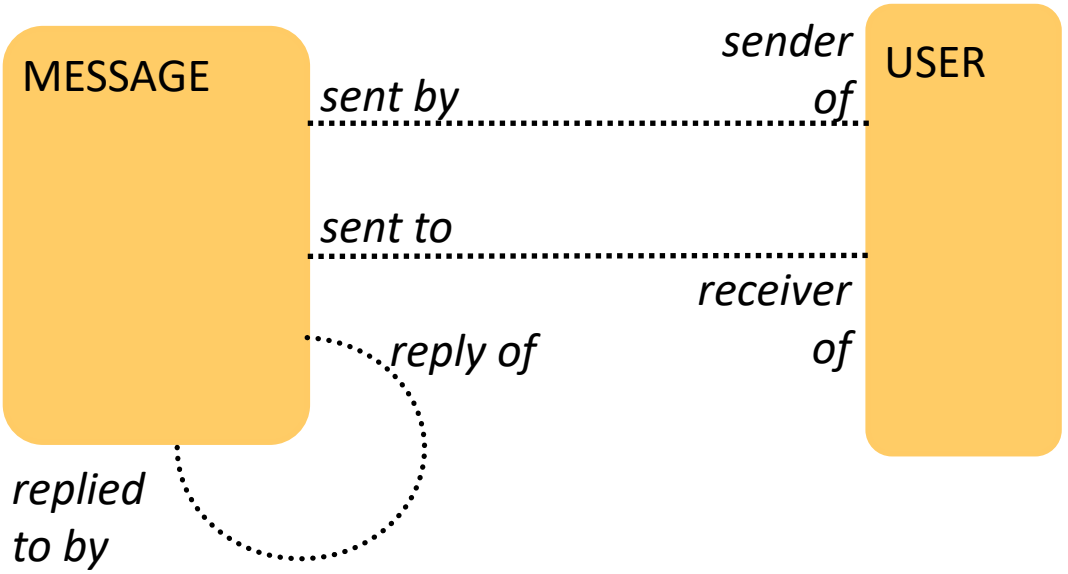
Subtype: Rules

- Subtypes of the same entity must be:
  - Exhaustive:
    Every instance of a supertype is also instance of one of the subtypes.
- and
  - Mutually exclusive:
    Every instance of the supertype is of *one and only one* subtype.

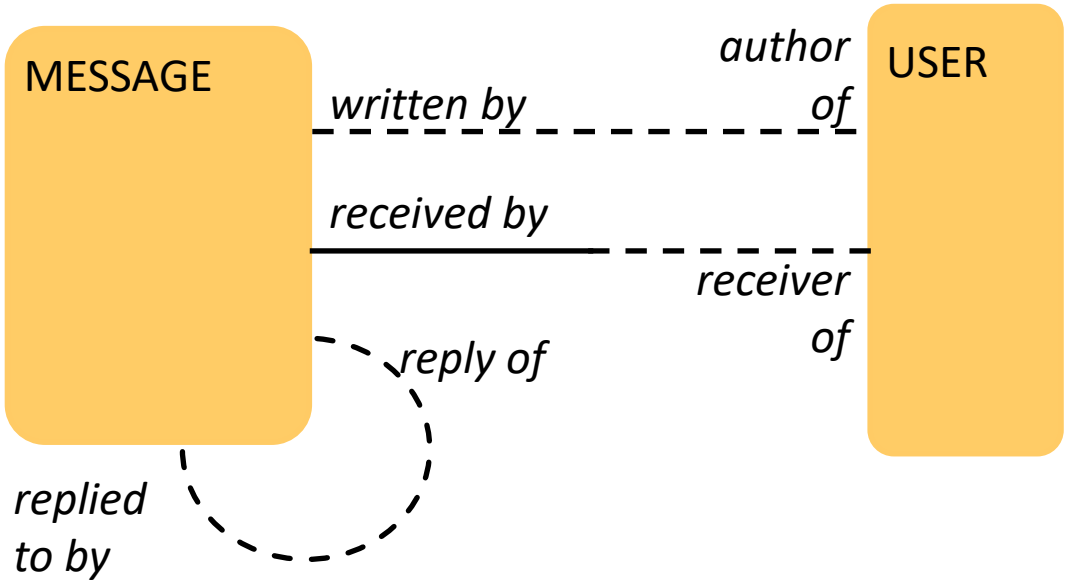
Name subtypes adequately:



Relationship Names

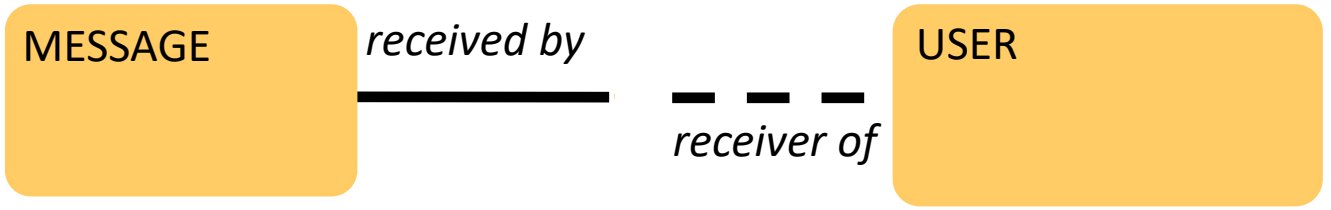


Optionality



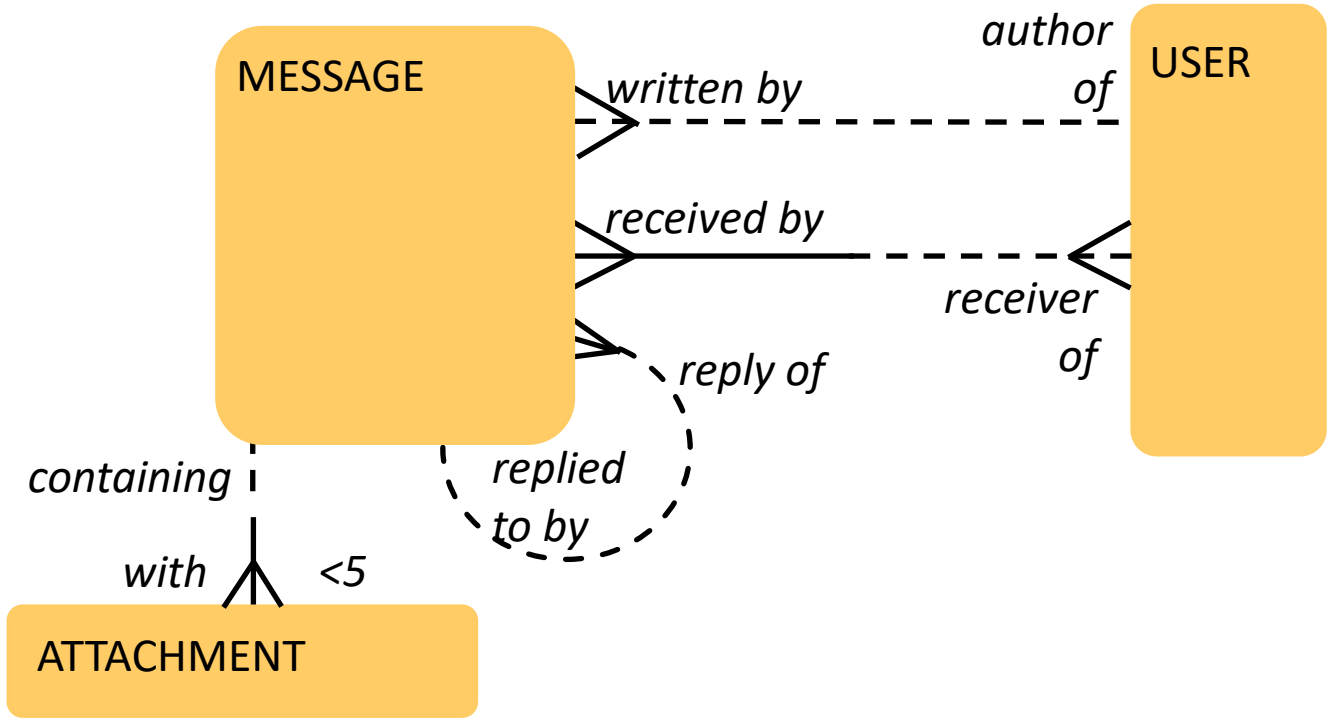
Optionality

No: – – – – · Yes: ————

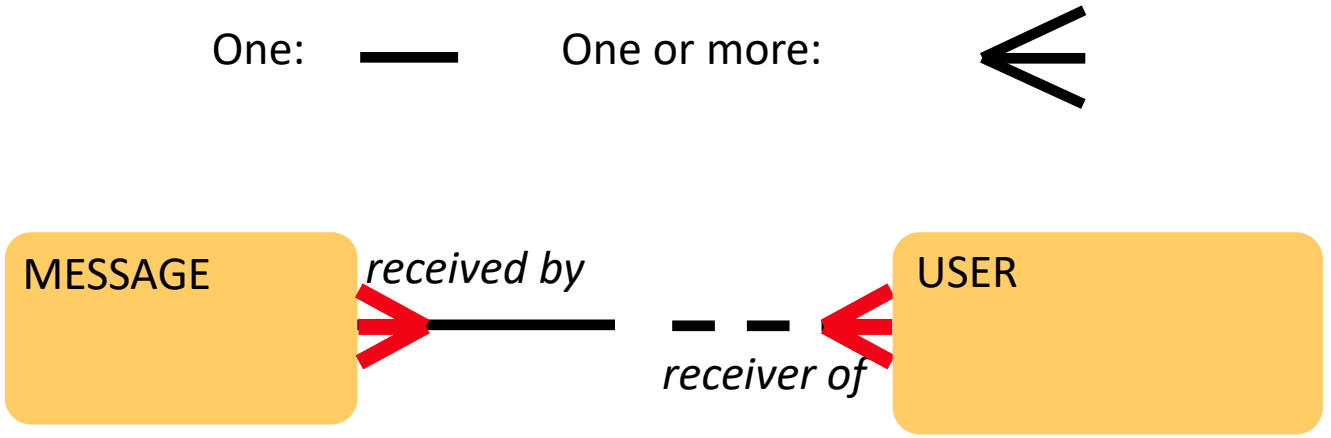


- *Must* every MESSAGE be received by a USER? *Yes*
- *Must* every USER be receiver of a MESSAGE? *No*

Degree


MESSAGE
written by
author
of
USER
received by
receiver
of
reply of
replied
to by
containing
with
<5
ATTACHMENT

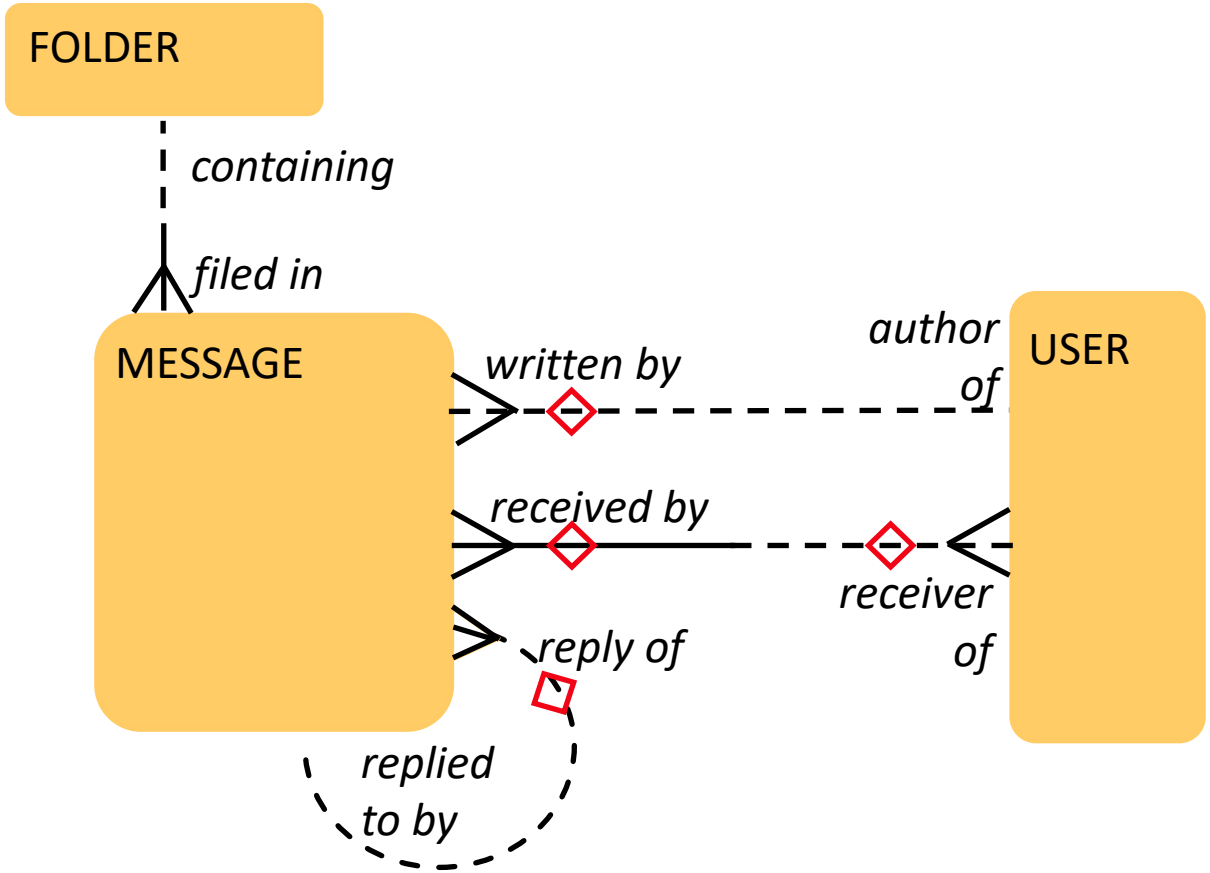
Degree



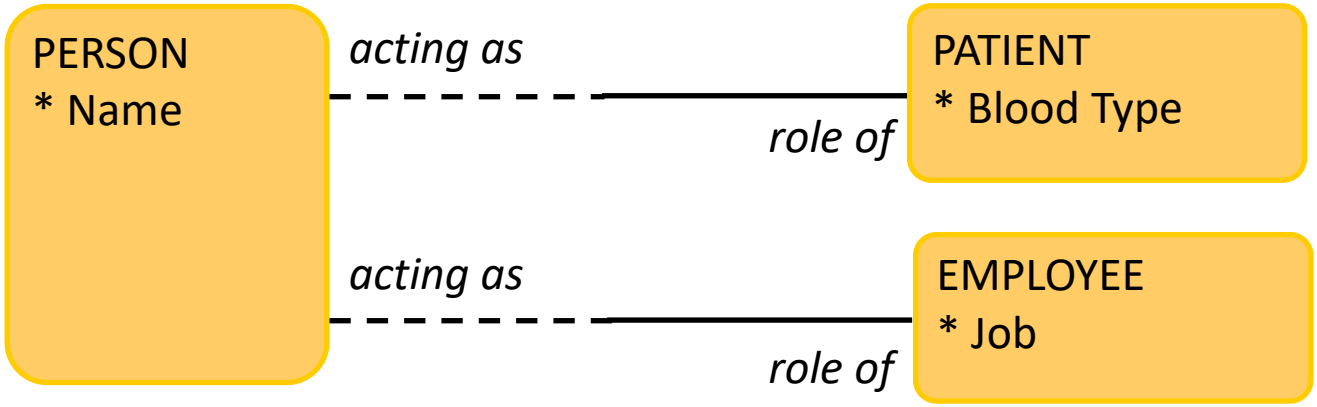
- *Can* a MESSAGE be received by *more than one* USER? *Yes*
- *Can* a USER be the receiver of *more than one* MESSAGE ? *Yes*

Nontransferability

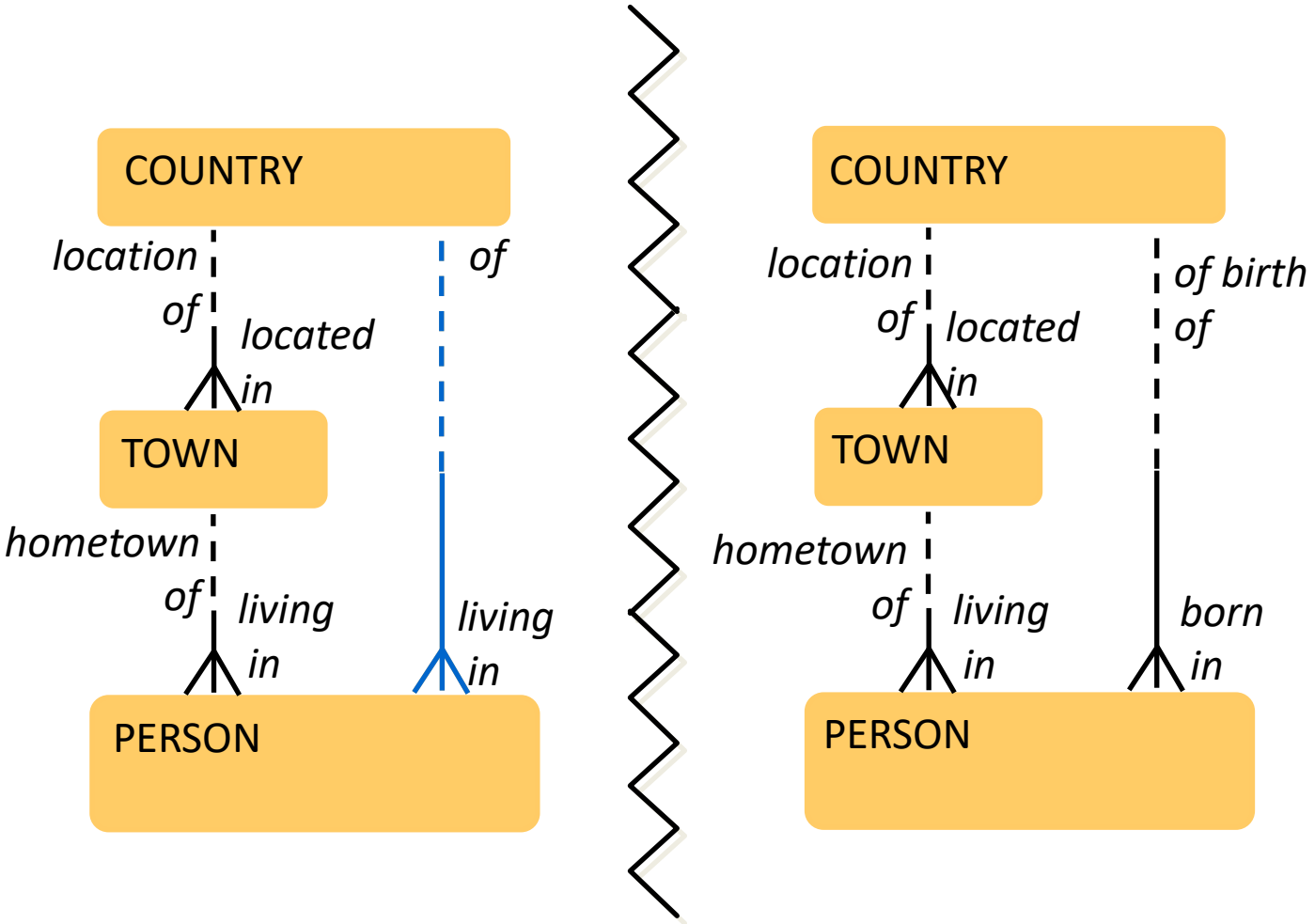
(leads to nonupdatable foregin keys)



1:1 Relationships
Roles



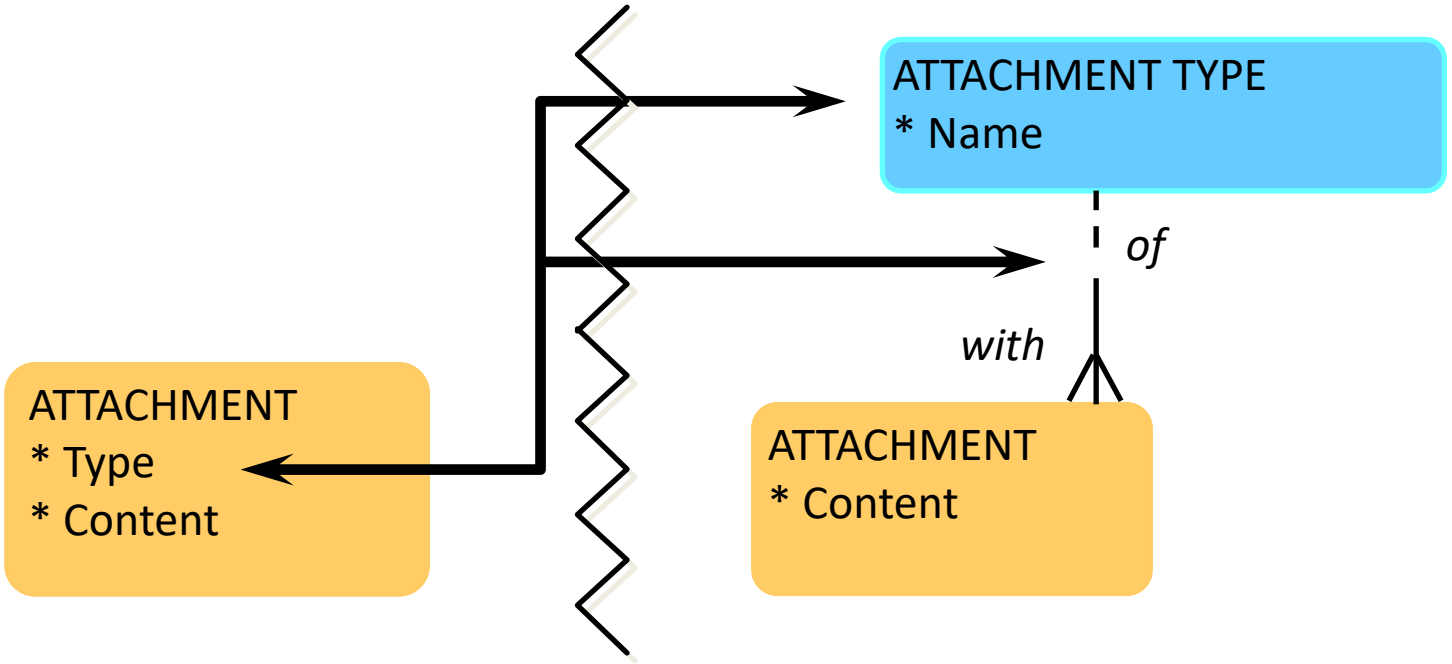
Redundant Relationships



Relationships and Attributes

– An attribute can hide a relationship

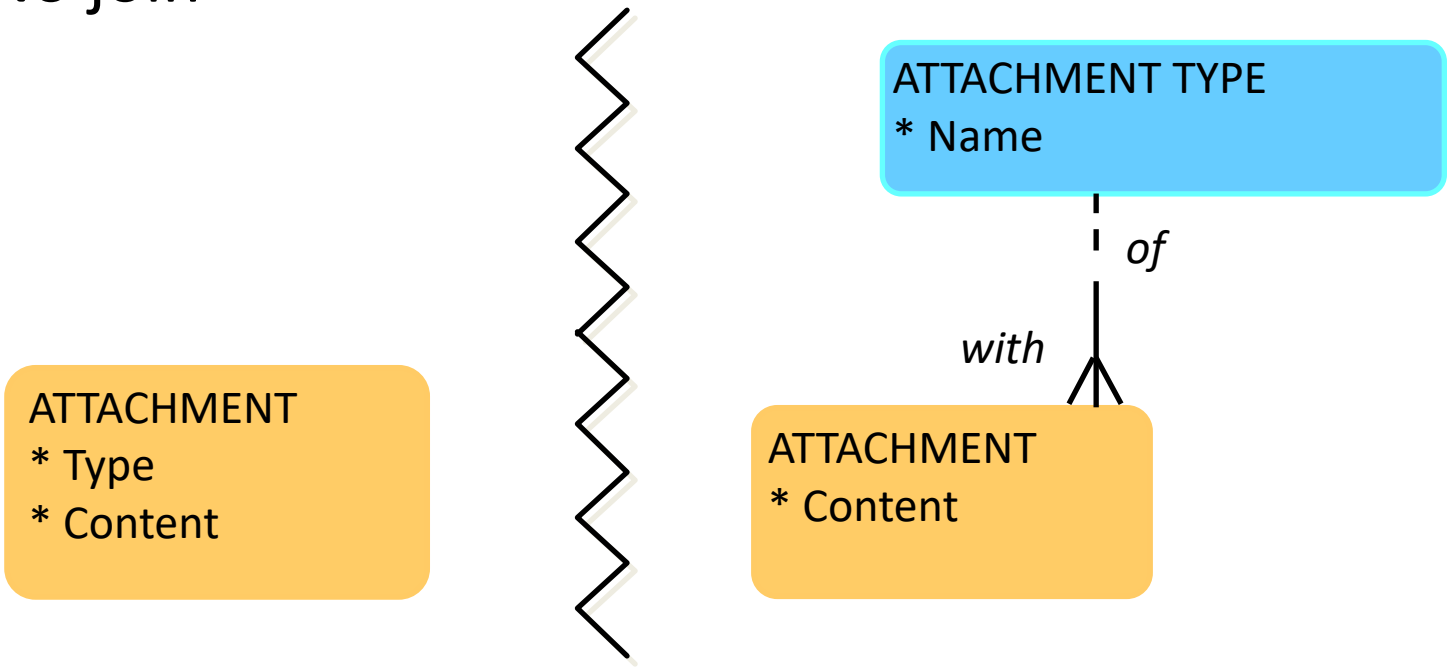
– Relationship can be “downgraded” to attribute



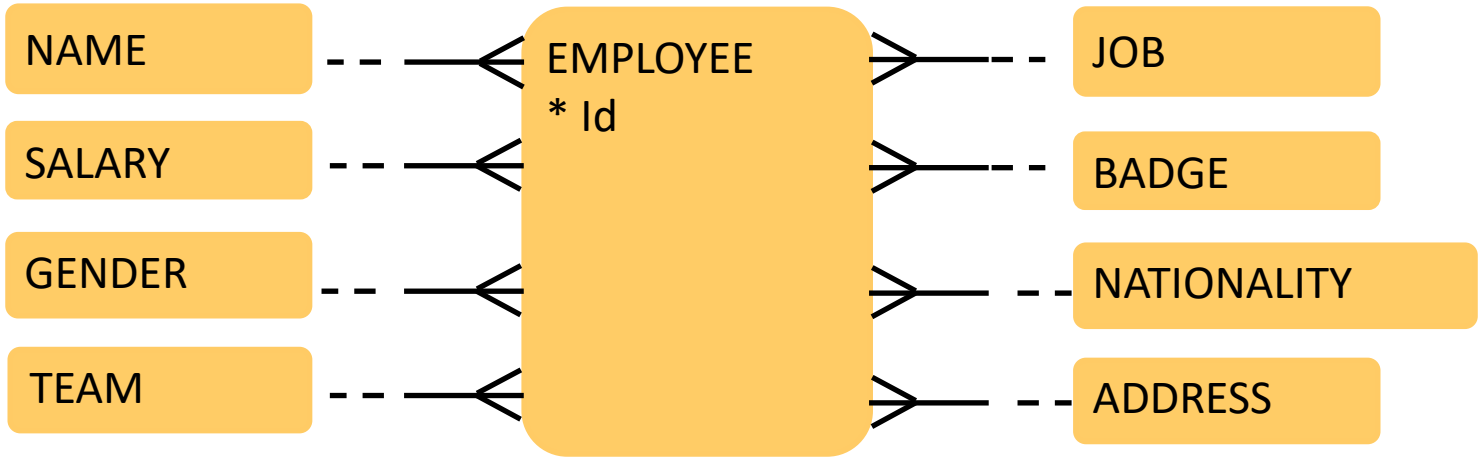
Attribute Compared to Relationship

- Easy model
- Fewer tables
- No join

- Value control
- List of values
- Other relationships

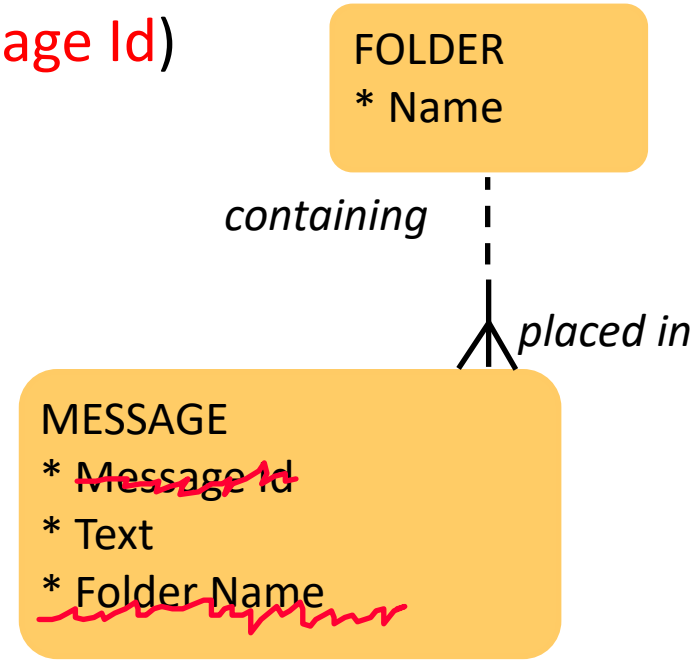


Attribute or Entity

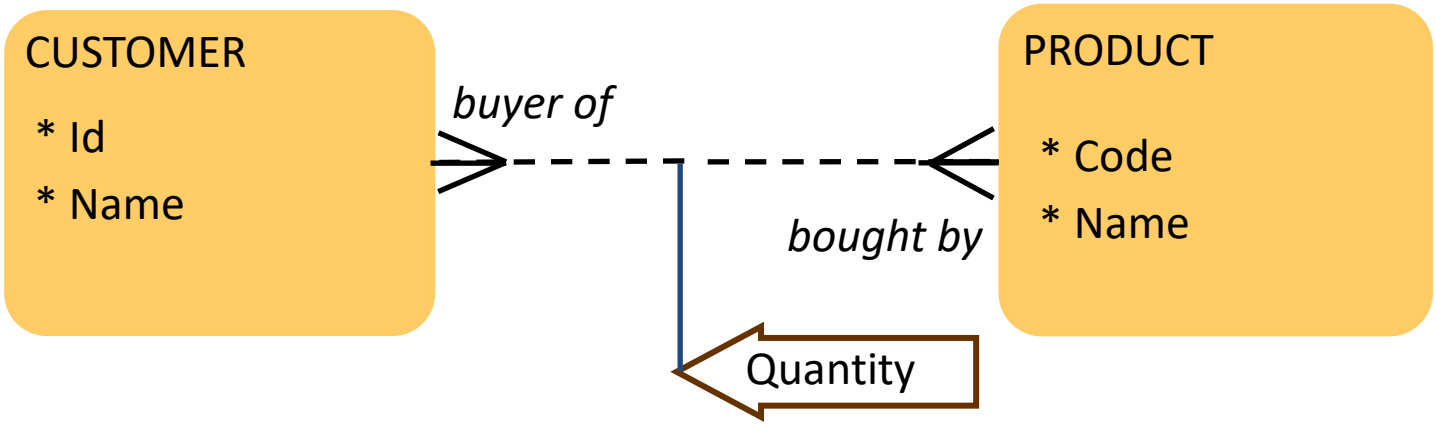


Attribute Compared to Relationship

- There is no such thing as a foreign key attribute (Folder name)
- Usually, the attribute name should not contain an entity name (Message Id)

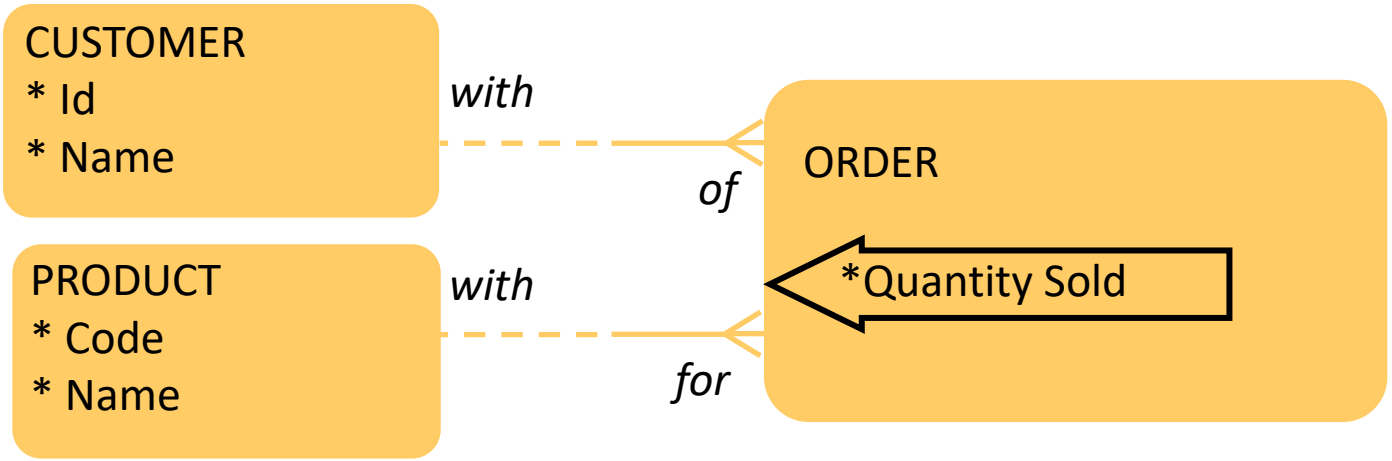


Attribute of Relationship ?



Relationships cannot have attributes. We need a new Entity.

New Entity ORDER



CUSTOMERS

Id	Name
1 2	Sanchez
3 4	Lowitch
	Yomita

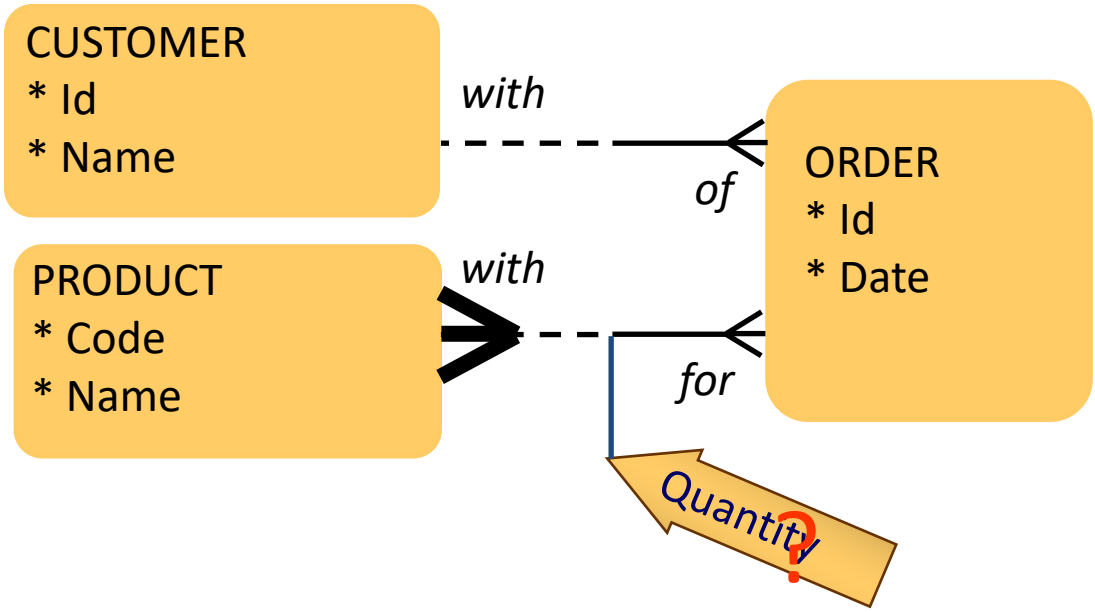
PRODUCTS

Code	Name
1	Jeans
2	Shirt
3	Tie

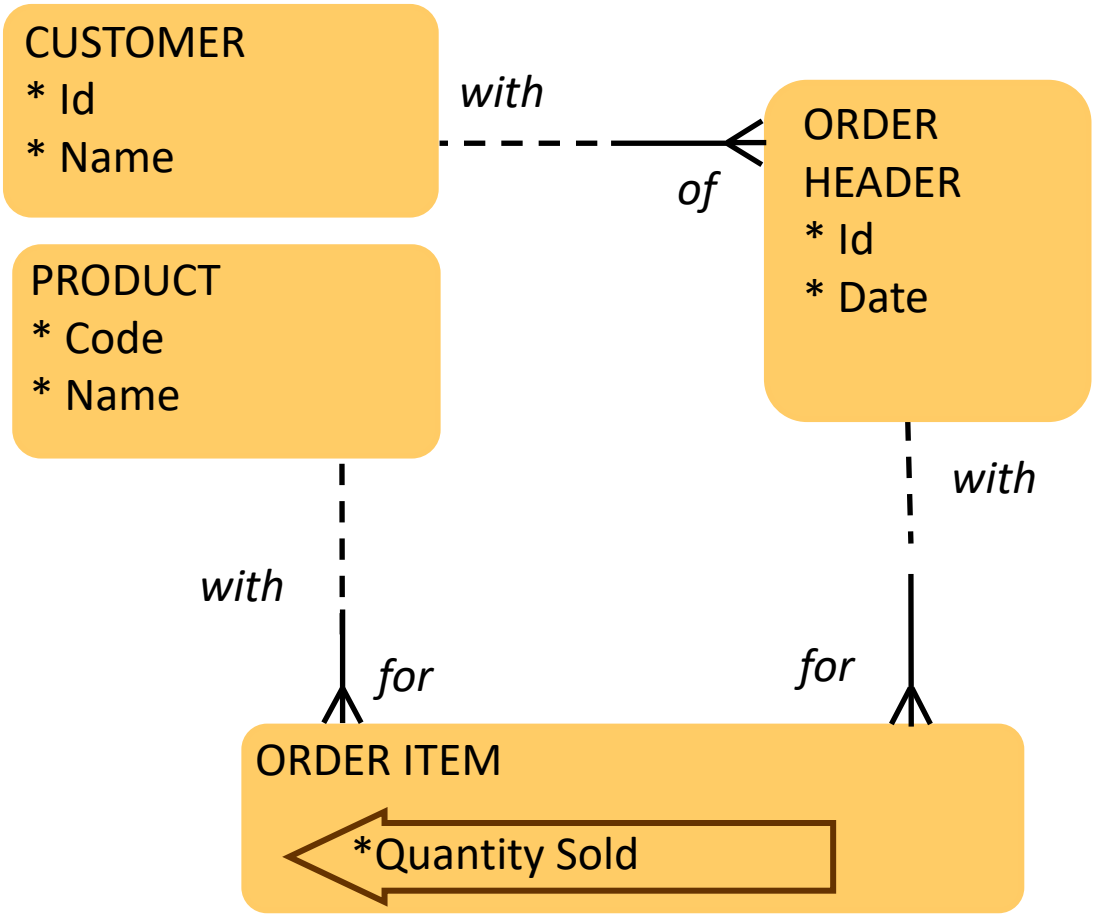
ORDERS

Ctr_id	Pdt_code	Quantity_sold
1	2	2
1	3	2
2	2	1
3		

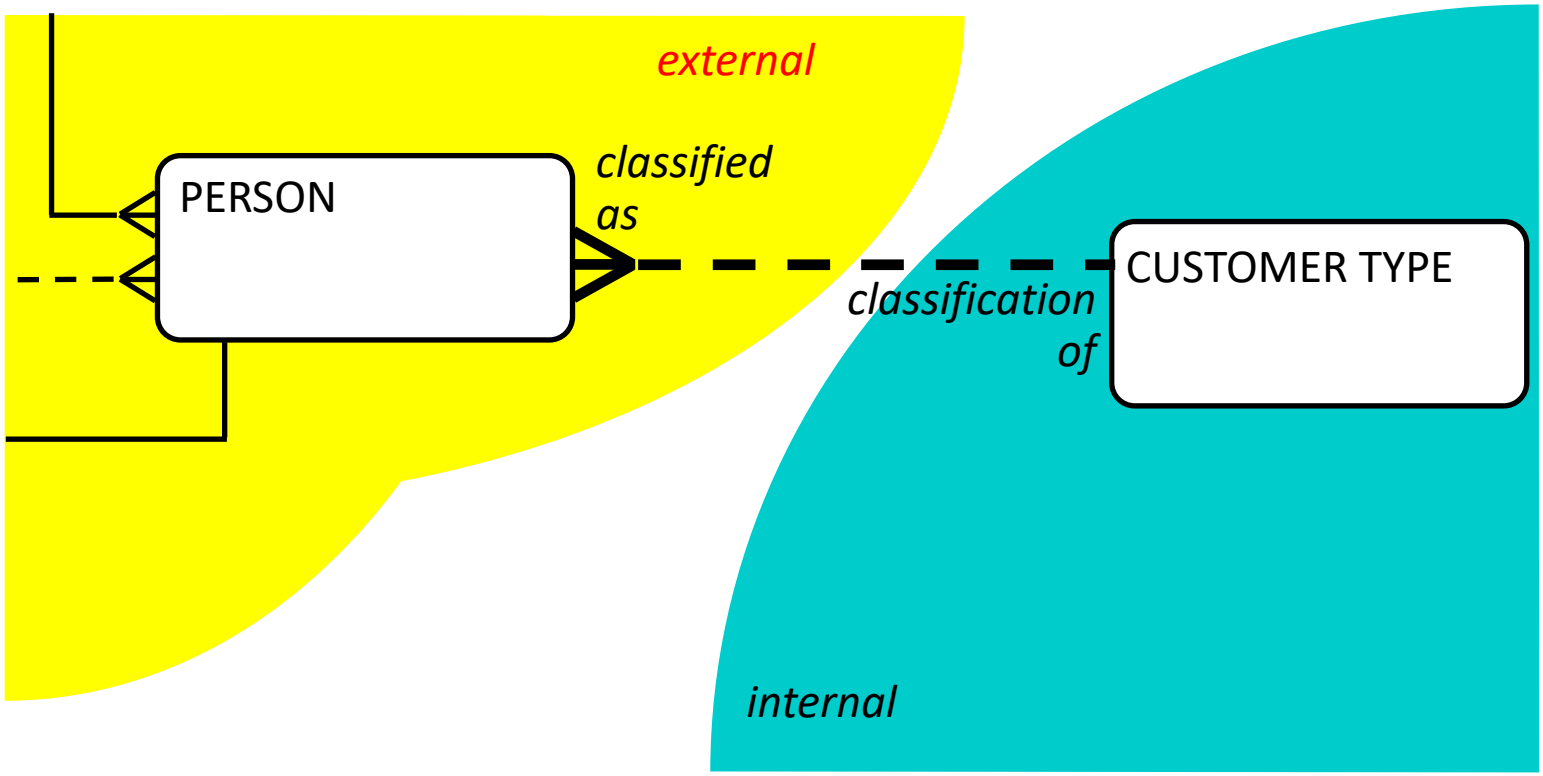
Multiple PRODUCTS for an ORDER



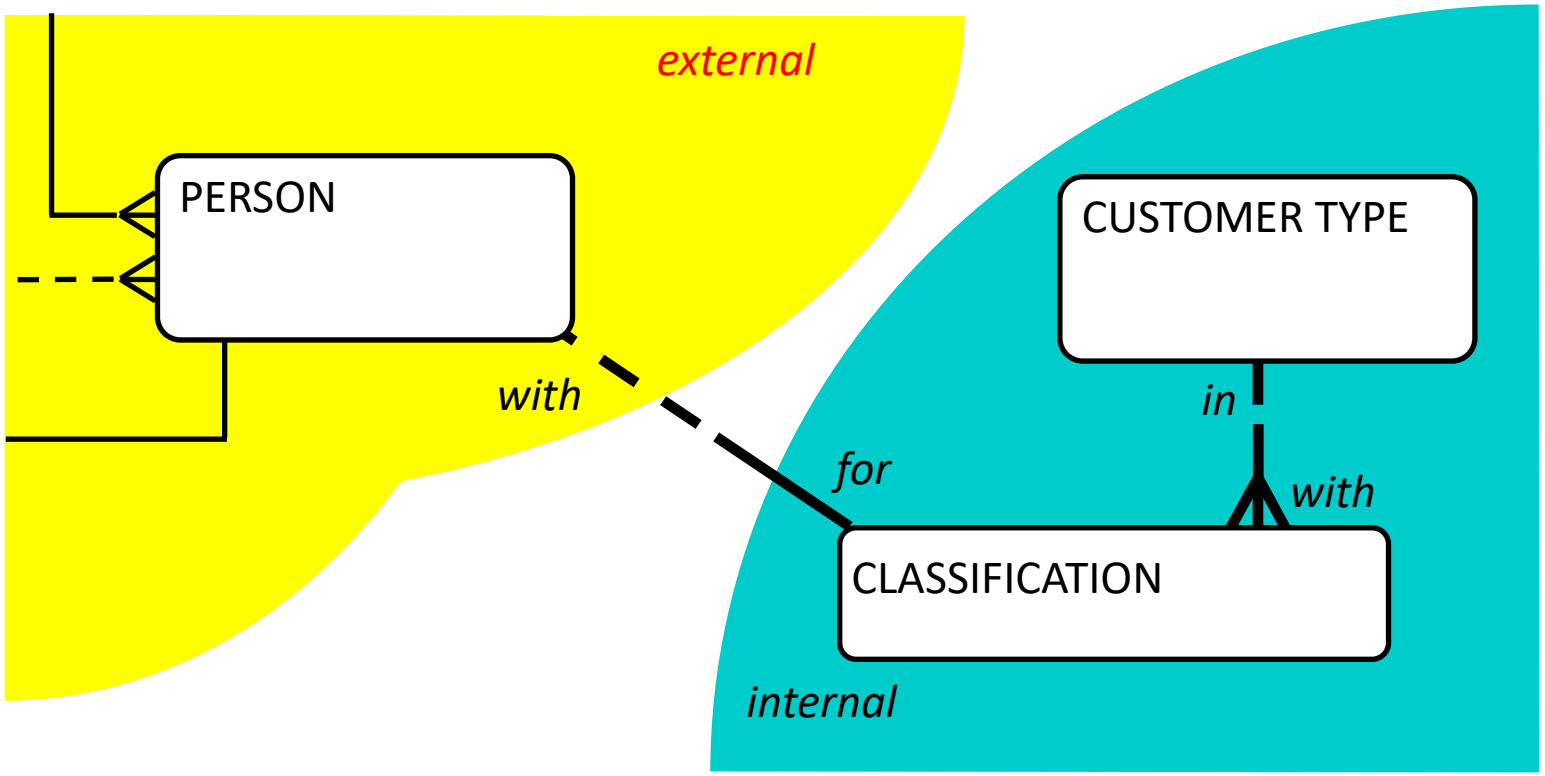
Another New Entity: ORDER ITEM



Resolving m:1 Relationship



Resolving m:1 Relationship



Normalization Rules

Normal Form Rule	Description
First Normal Form	All attributes are single valued.
Second Normal Form (2NF)	An attribute must be dependent upon entity's entire unique identifier.
Third Normal Form (3NF)	No non-UID attribute can be dependent on another non-UID attribute.

"A normalized entity-relationship data model automatically translates into a normalized relational database design"

"Third normal form is the generally accepted goal for a database design that eliminated redundancy"