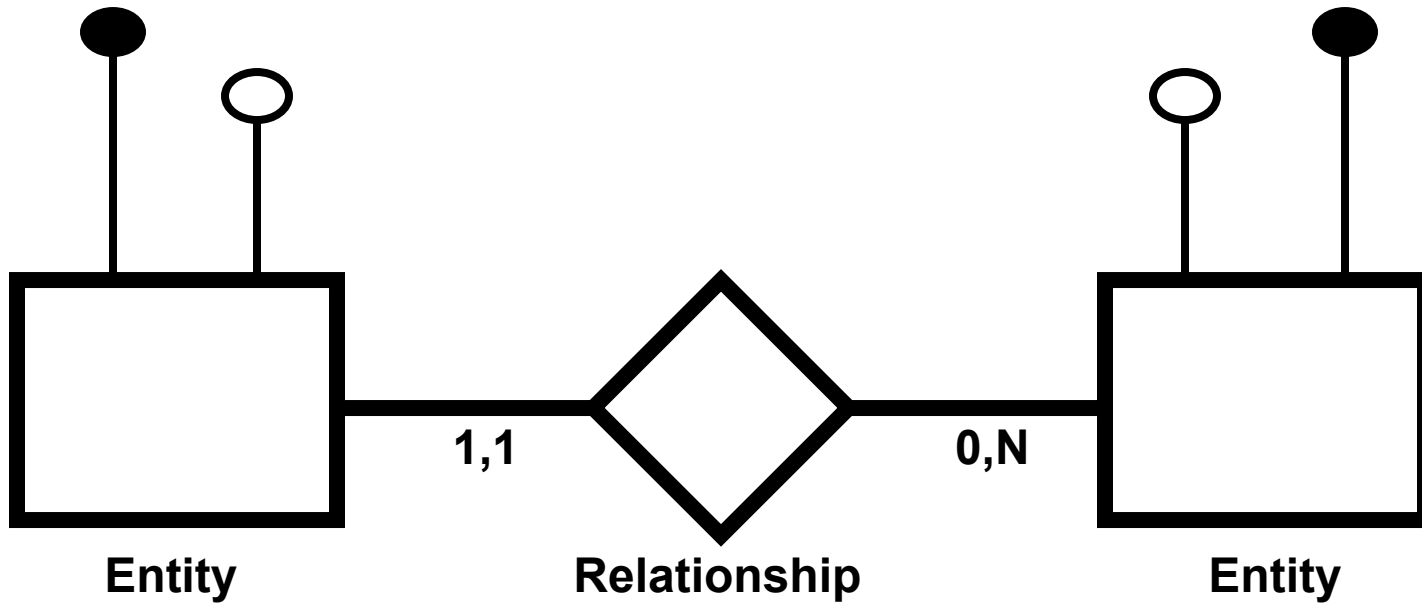
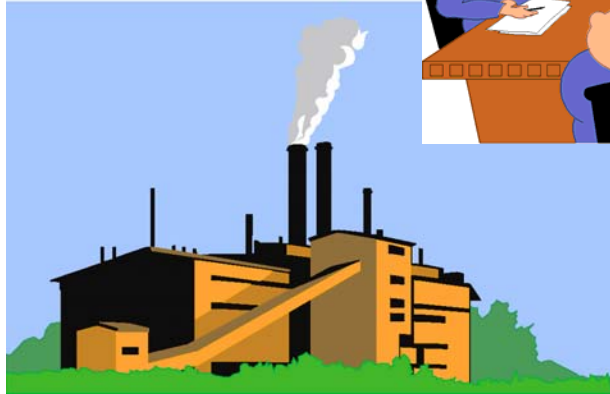


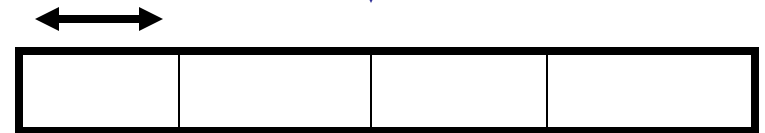
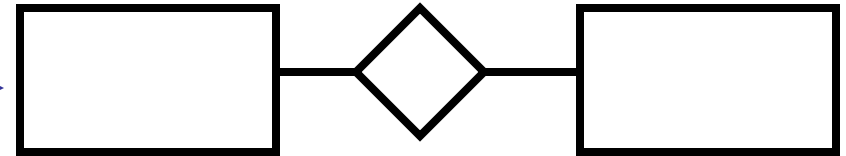
Entity-Relationship Modeling



Enterprise

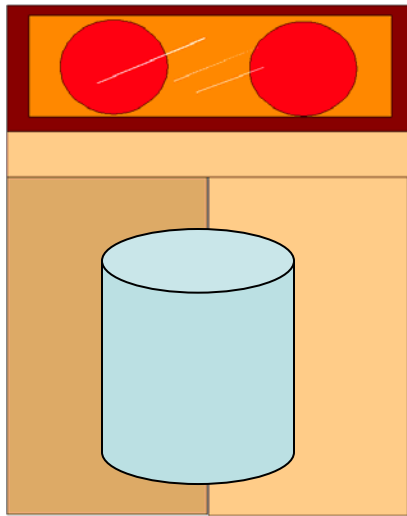


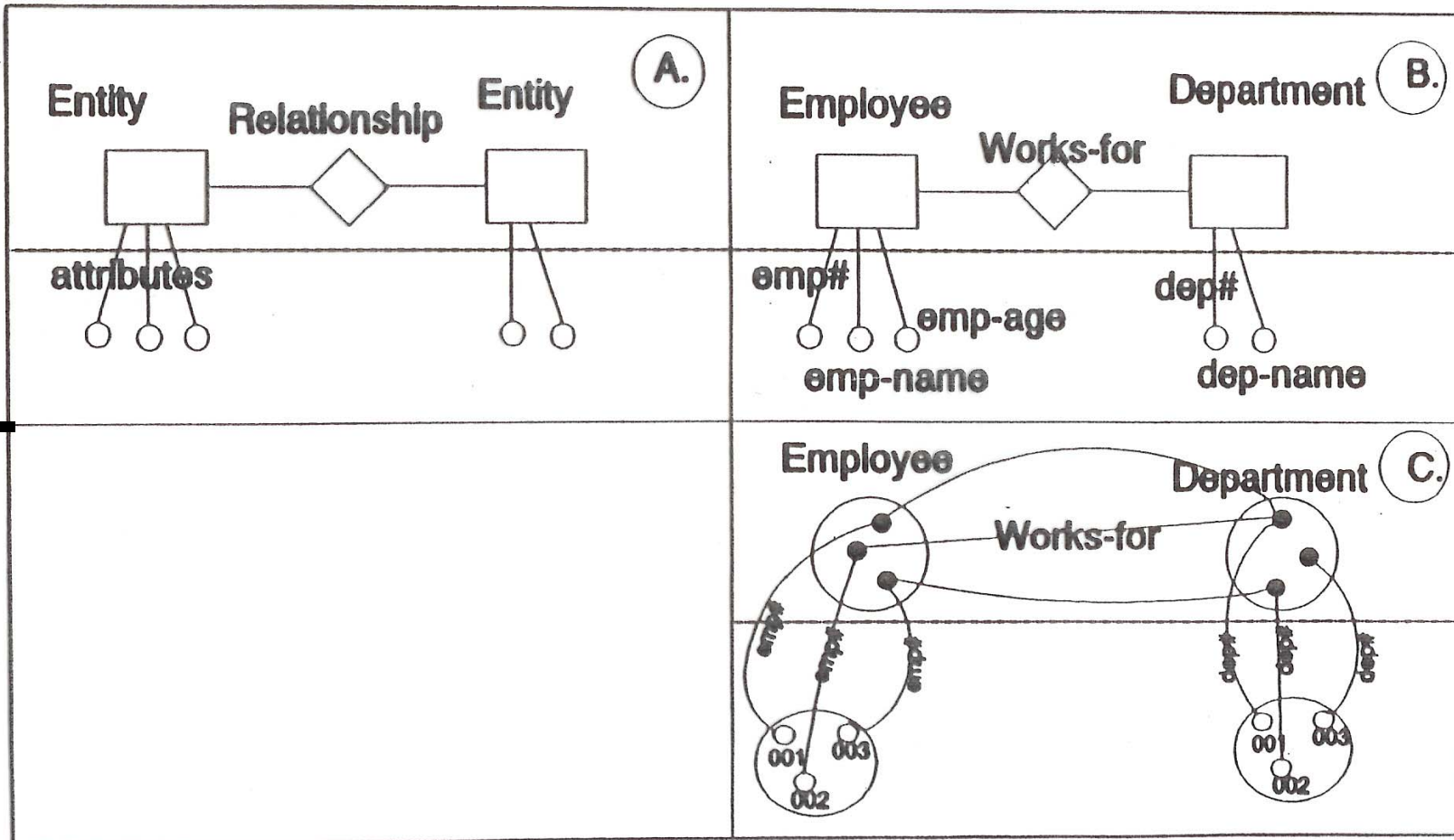
*Business Modeling
Requirement Analysis*



*Database
Design*

*Database
Implementation*





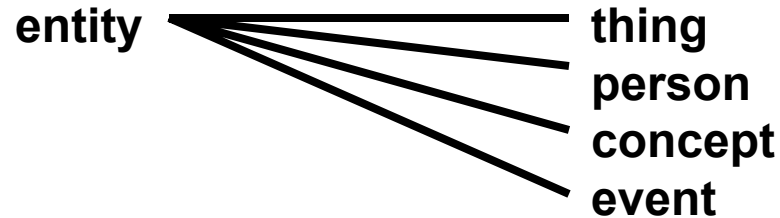
“The employee with emp# ‘001’ works for the department with dep# ‘001’”

Representation of a (business) reality in terms of The E-R (Entity-Relationship) Modeling Language

Entity

DESCRIPTION: Entities represent real-world objects; things which can be named.

EXAMPLE: customer, sale



SYMBOL: rectangle

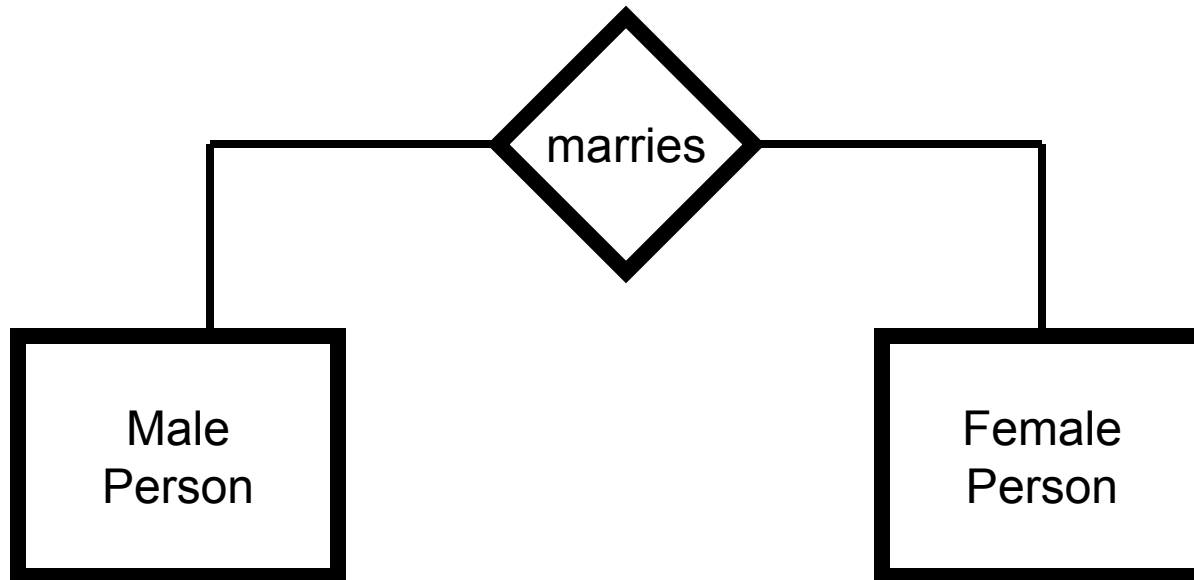


Relationship

DESCRIPTION: Association between two (or more) entities

EXAMPLE: “male person” marries “female person”

SYMBOL: diamond-shaped figure



Attribute

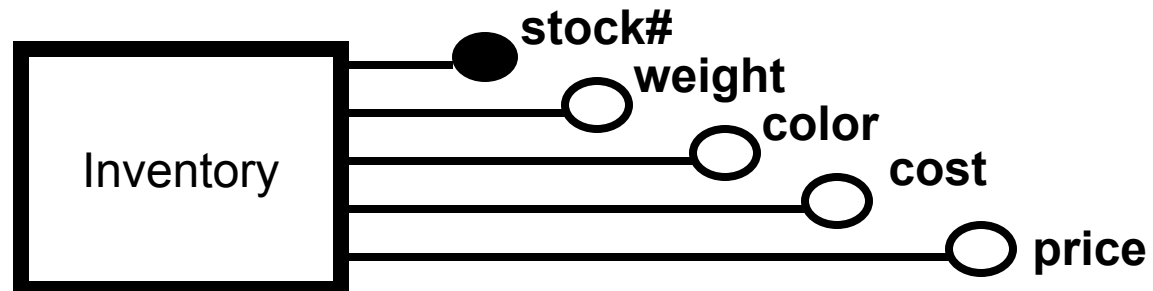
DESCRIPTION: They are the characteristics or elementary properties of an entity or relationship; they will be used for the actual communication about the real-world phenomena represented by entities and relationships.

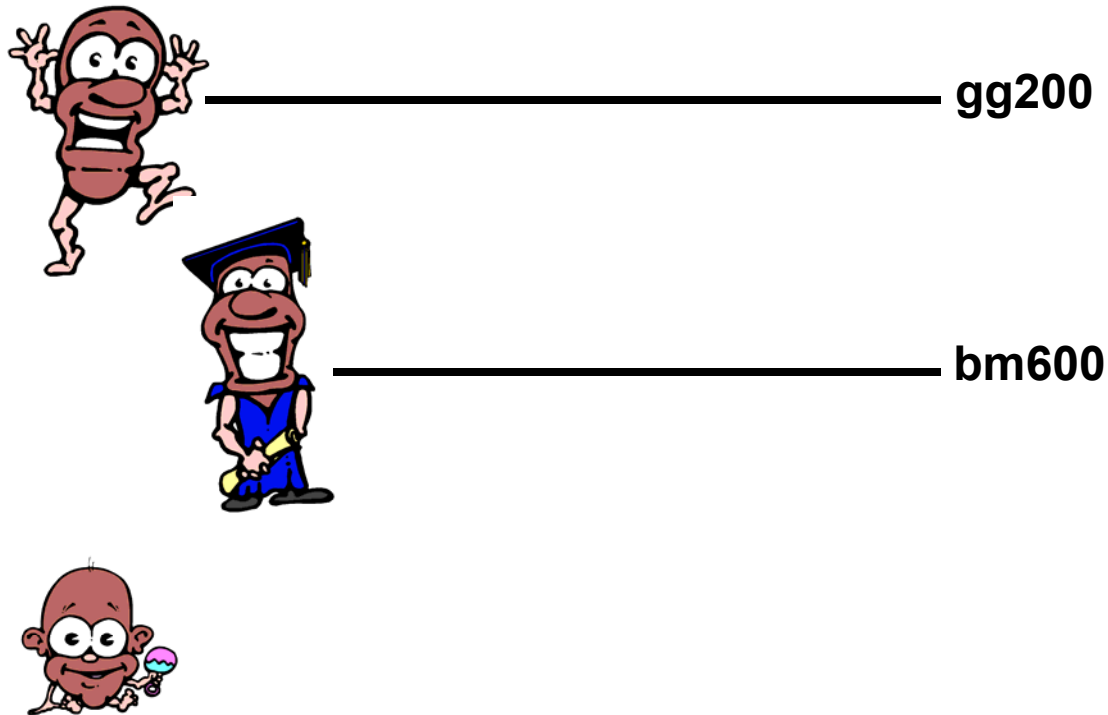
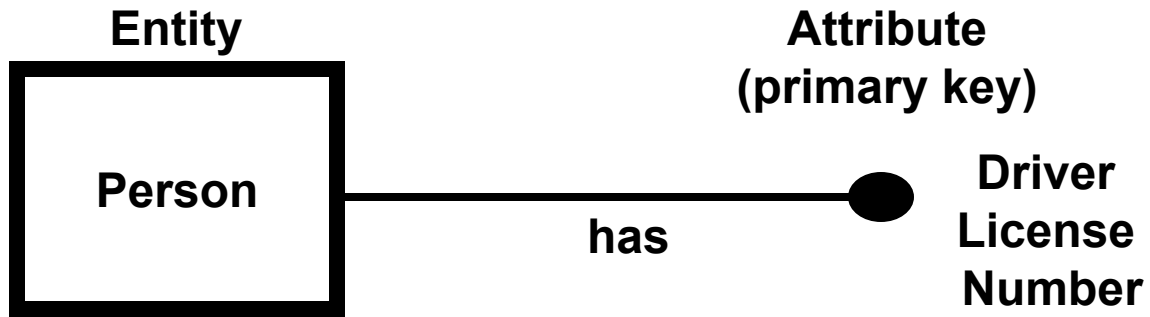
EXAMPLE: Which data elements will be used to communicate about (the entity) inventory?

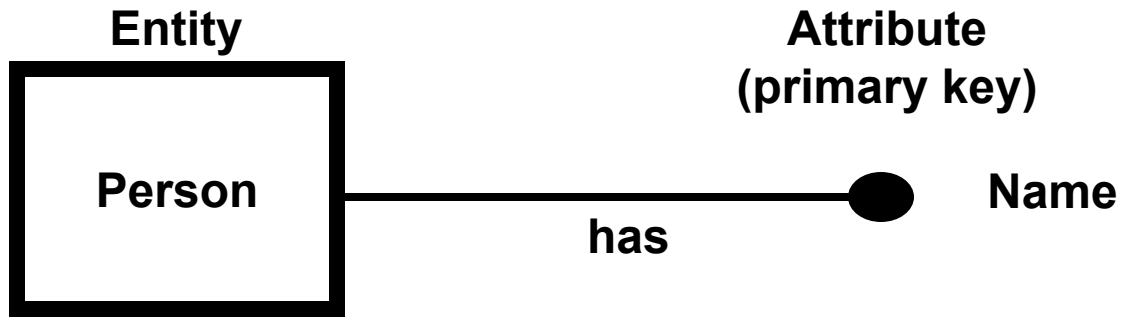
inventory

- stock#
- weight
- color
- cost
- price

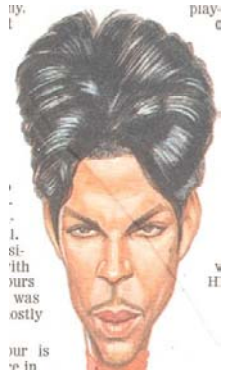
SYMBOL: small circle



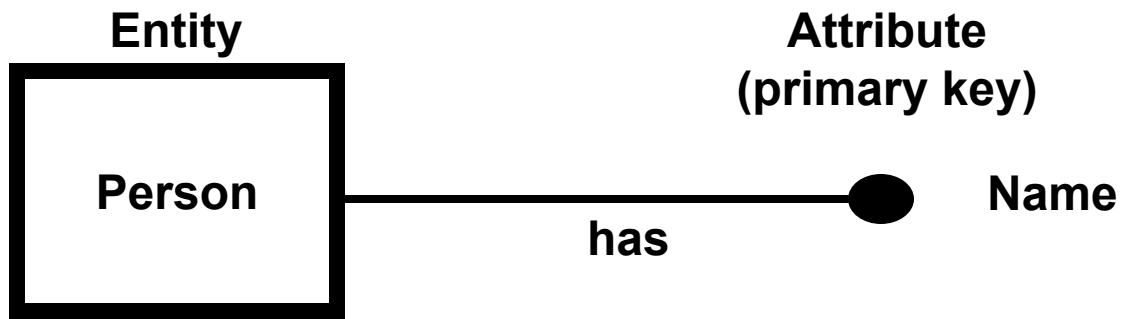




Charles



Prince

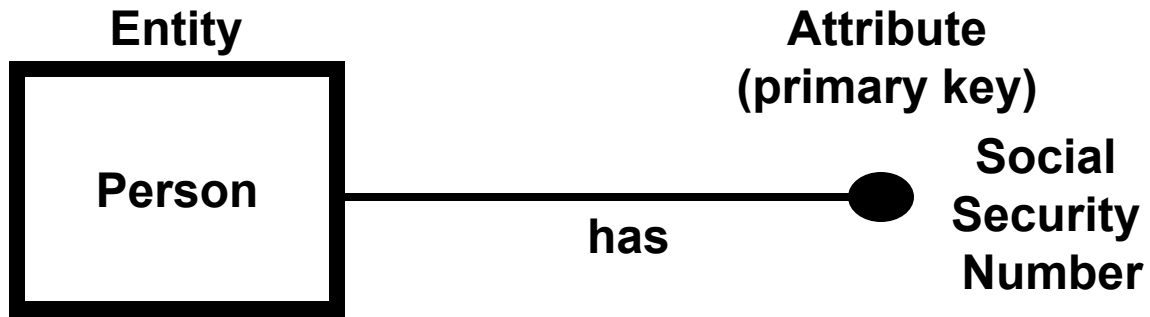


_____ **Marilyn**

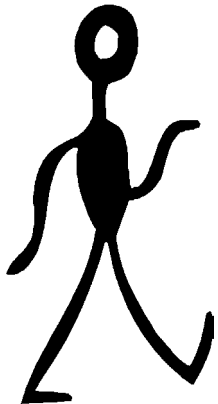
_____ **Ann**



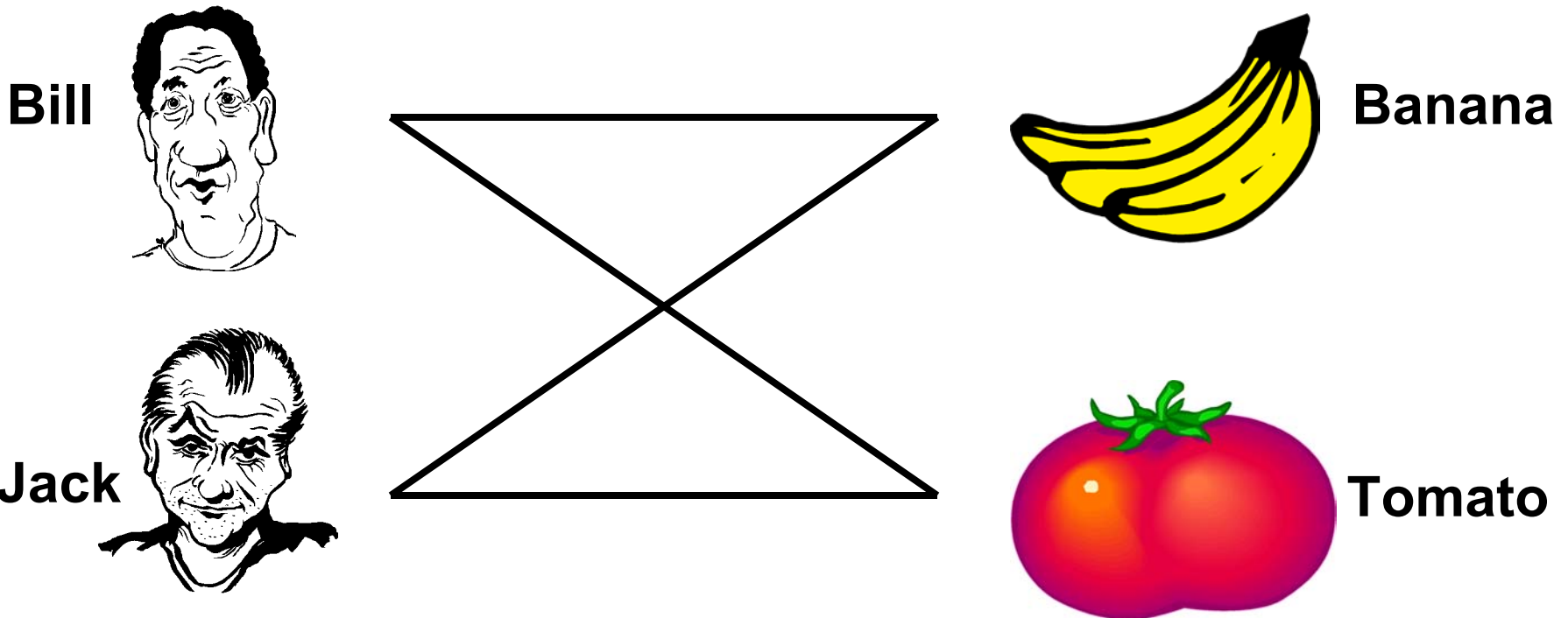
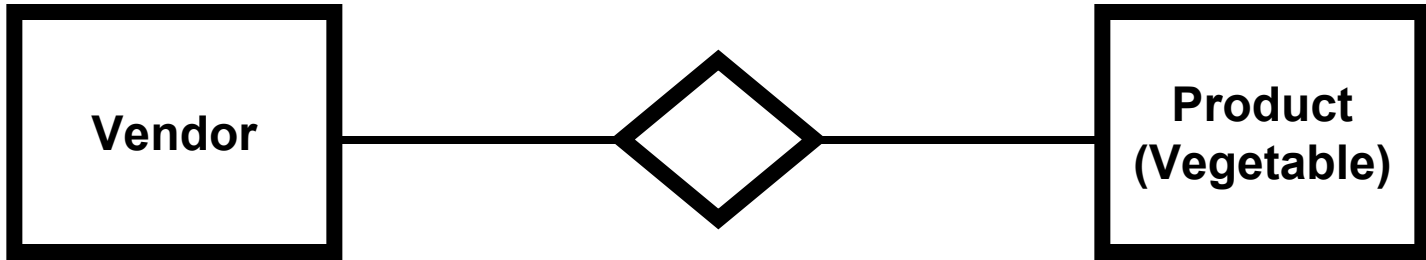
_____ **Hilary**



_____ 678977

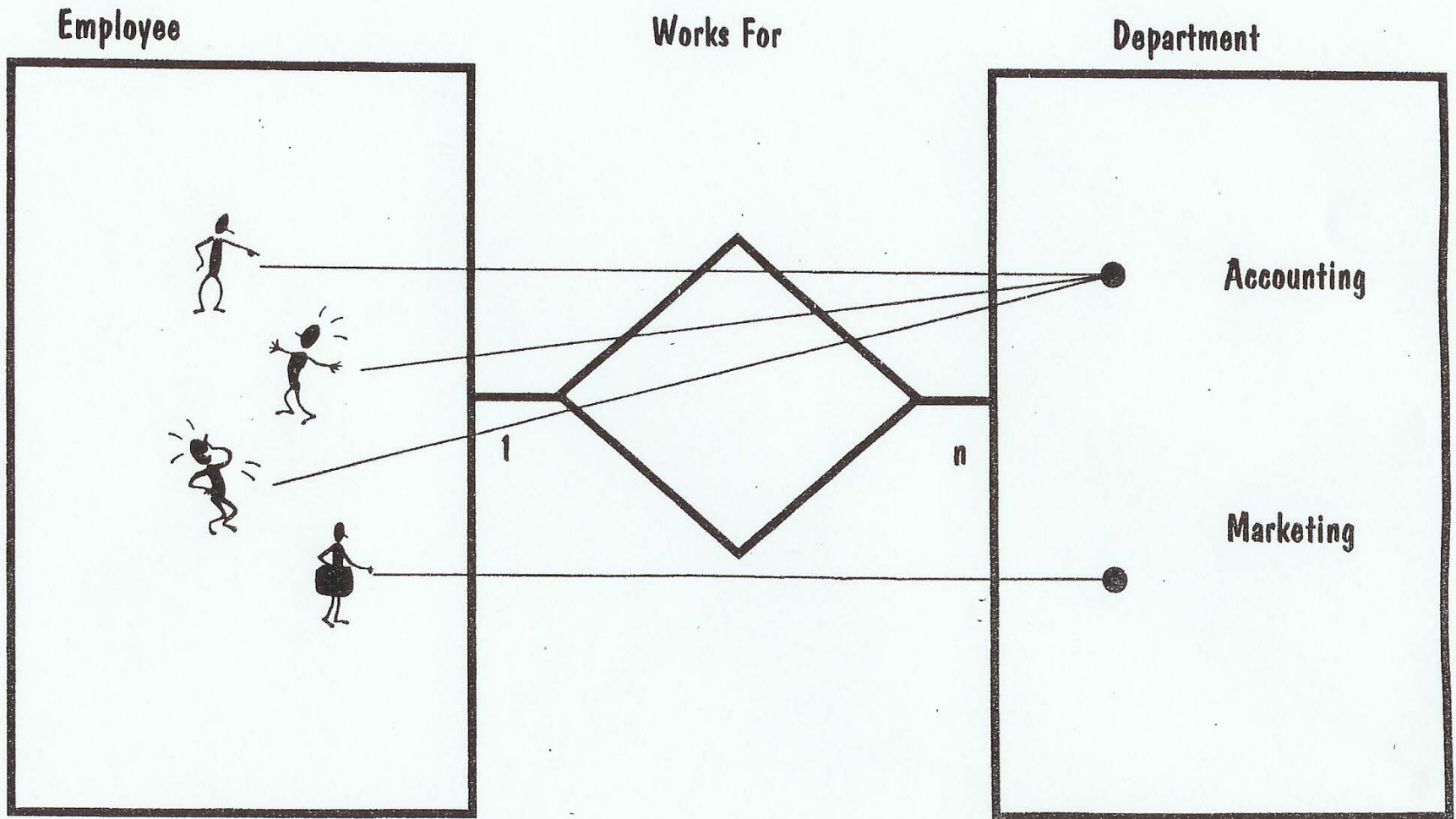


_____ 903244



**Information that needs to be stored:
“Price per Vendor per Product”**

Maximal Cardinality: Maximal cardinality expresses the number of times an instance can appear at most in a relationship.



1: an employee works for one department

n: many employees can work for the same department (no restrictions)

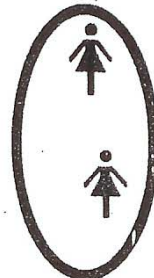
1. A man has at most one wife. A woman has at most one man.



Male Person

Female Person

2. A woman can have more than one husband. A man has at most one wife.



Male Person

Female Person

3. A man can have more than one wife. A woman has at most one husband.



Male Person

Female Person

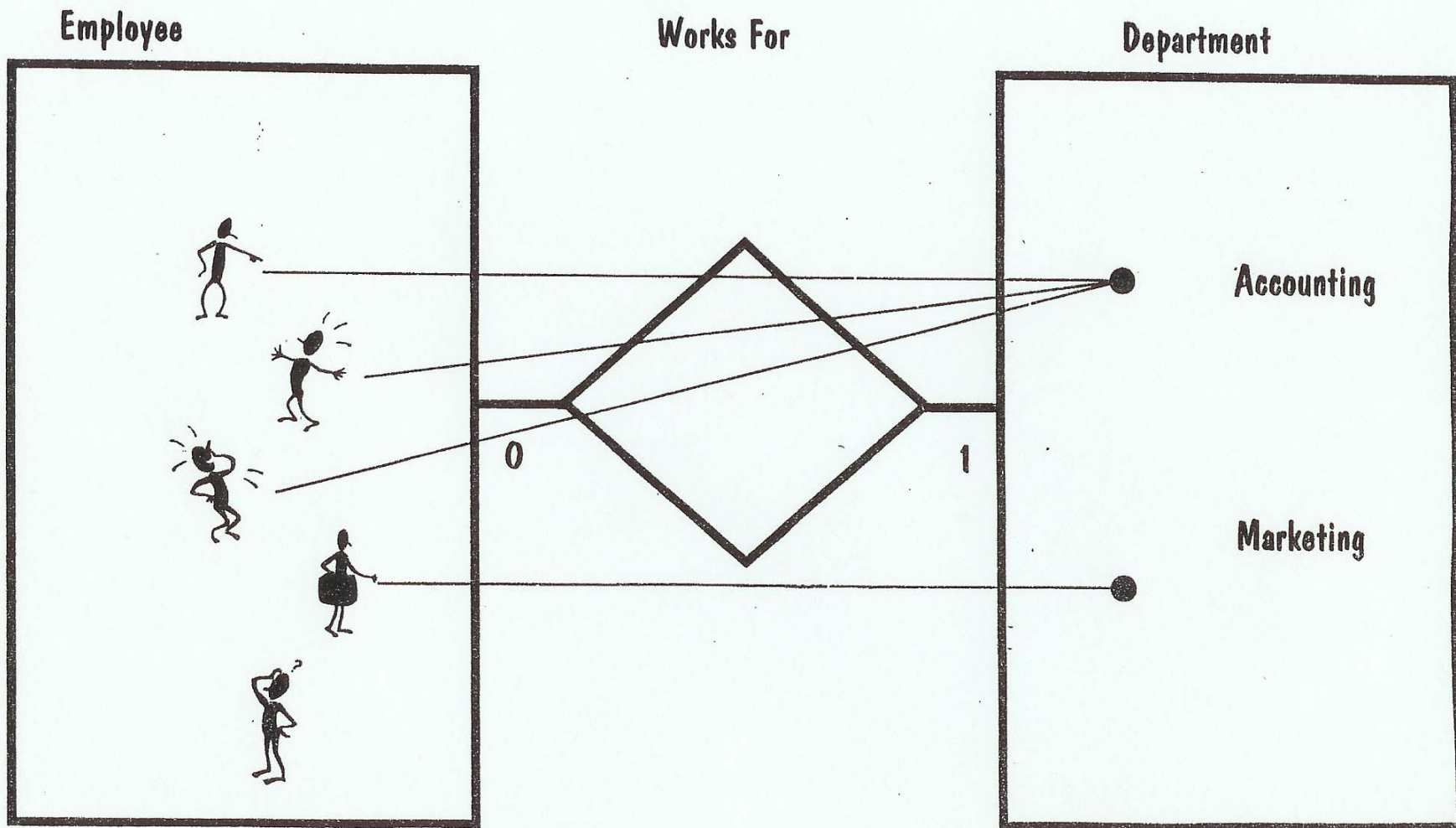
4. A woman can have more than one husband. A man can have more than one wife.



Male Person

Female Person

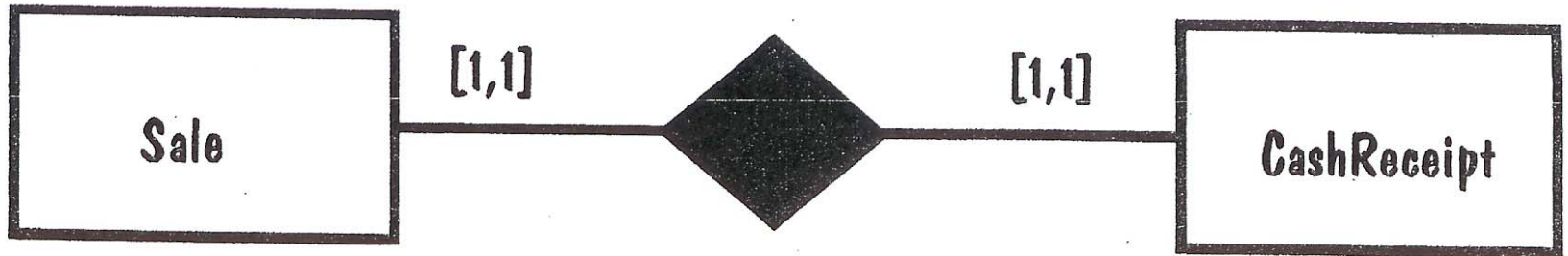
Minimal Cardinality: Minimal cardinality expresses the number of times an instance must appear at a minimum in a relationship.



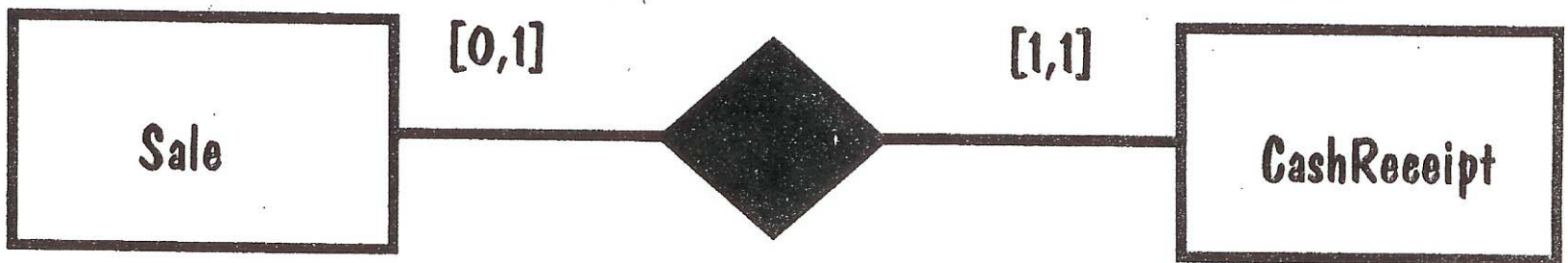
0: an employee is not necessarily assigned to a department

1: at least one employee is assigned to a department

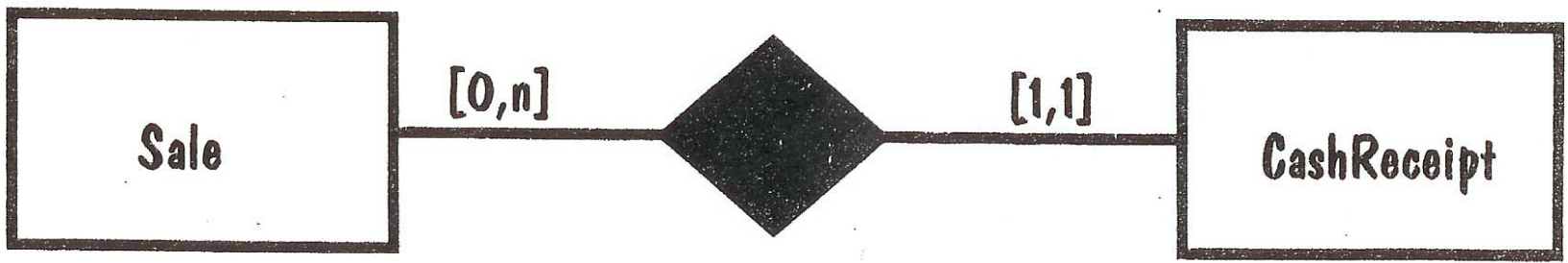
1



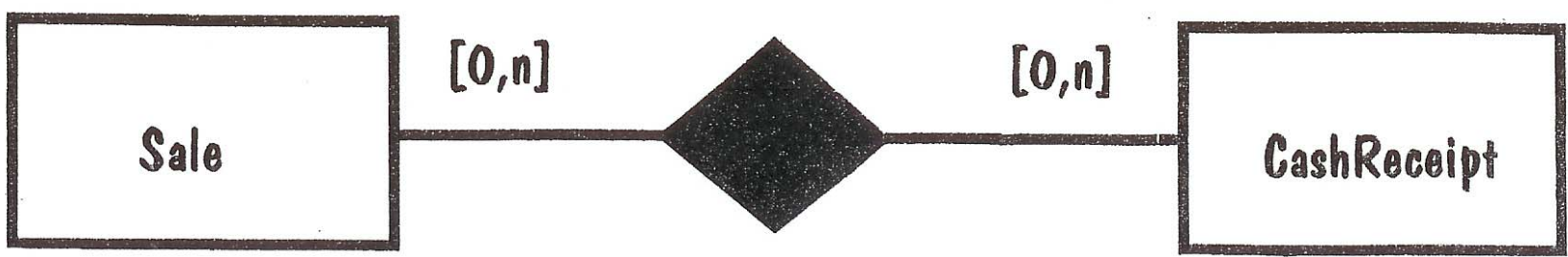
2.



3



4



REALITY



Mark



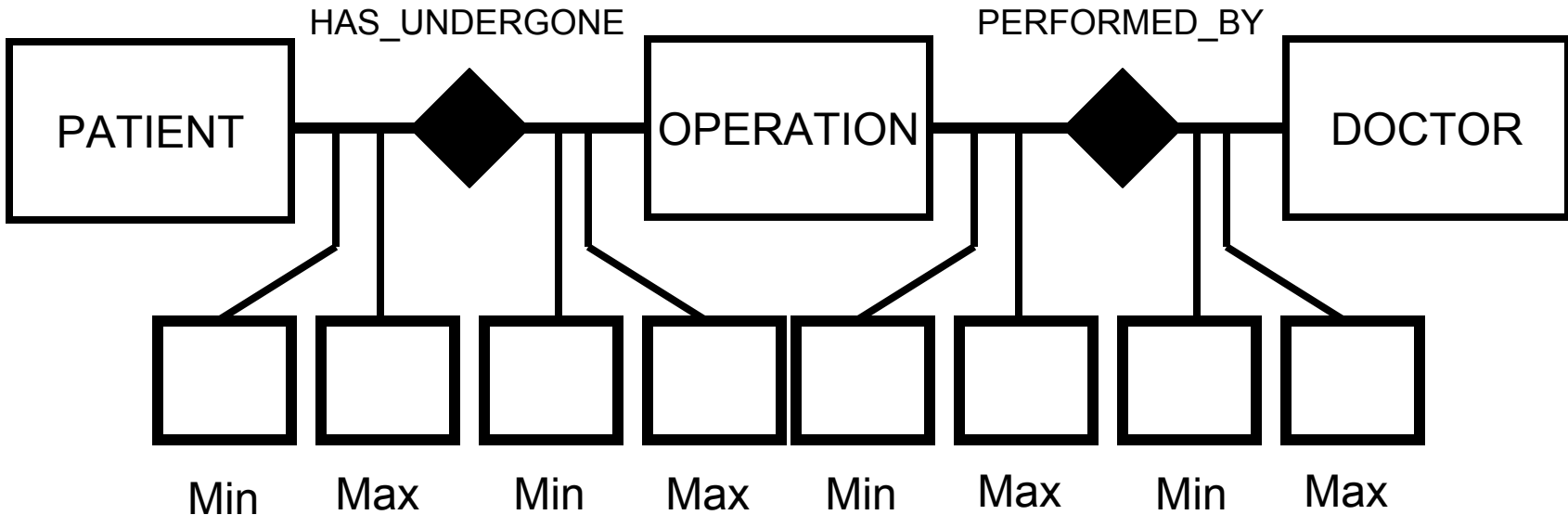
**Operation
'007'**



Tom

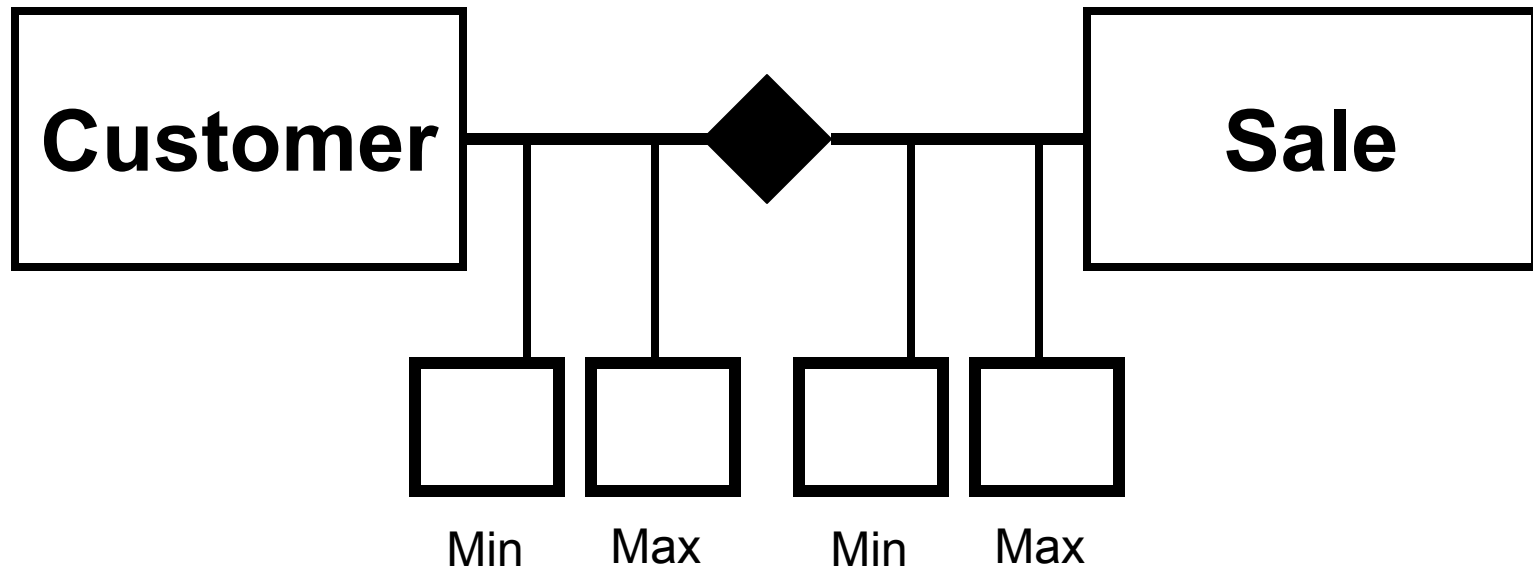


Ed



**ENTERPRISE
MODEL**

We have recorded information for more than thousand customers. Jimmy (a customer) hasn't made a sale yet. Ellen (a customer) has made many sales. We record exactly one customer for each sale.



We like to record information for items even when we don't know any vendor for that item. We know (record) many vendors for most items. Each vendor offers at least one item.

