

Ch3: The enhanced E-R Model.

→ Definition: EER Model Concepts:

- Includes all modeling concepts of basic ER
- Additional concepts:

- subclasses / superclasses
- Specialization / generalization
- attribute and relationship inheritance
- categories (UNION types)

→ Subclasses and Superclasses

→ Subclasses / sub-type

In a basic ER model an entity is defined by the attributes it possesses and the relationship types in which it participates.

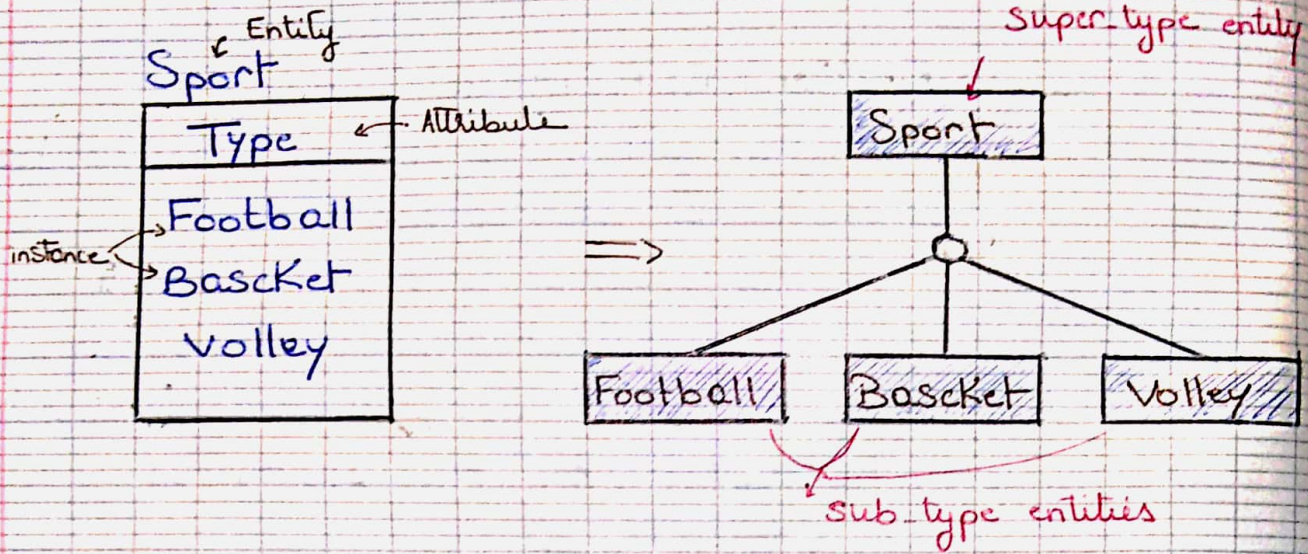
في بعض الحالات يكون لا Entity مجموعات فرعية لها مما يعني
محصرة عن غيرها. في هذه الحالة تتحول هذه المجموعات الفرعية
إلى sub-type.

→ Superclasses / super-type

هي اد Entity الأساسية التي حولها بعض الinstances
المنتسبين إليها إلى subtype

!!! N.B. عادة ما يكون ال sub-type هو instance ينتمي
لا attribute "type" التي تخص ال super-type

Example :



لقد حولنا أنواع الرياضة (Football, volley...) إلى sub-entities. لأن كل لعبة لها قوانينها الخاصة و بالتالي Attribute لها صيغ

Attribute Inheritance

يقوم sub-type بعناية كل Attribute و الـ Attribute التي يشترك فيها الـ super-type

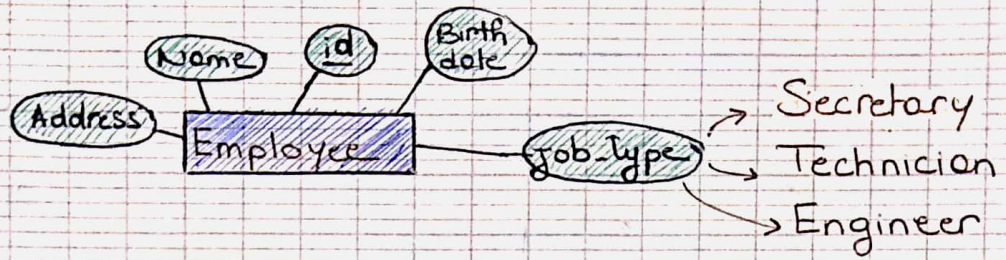
Relationship Inheritance

Relationships at the supertype level indicate that all subtypes will participate in the relationship.

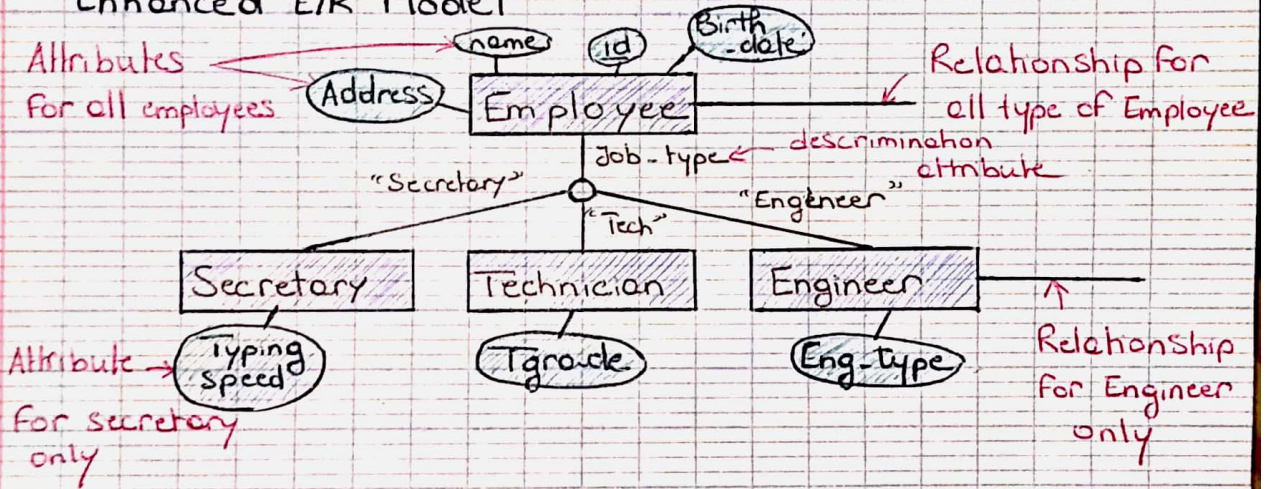
The instances of a subtype may participate in a relationship unique to that subtype. in this situation, the relationship is shown at the subtype level.

Example :

Basic EIR Model :



Enhanced EIR Model



N.B!!

The sub-type "secretary" has 5 attributes;

- Address
- name
- id
- Birth date
- Typing speed

The sub-type "Engineer" has 2 relationships.

Discrimination attribute "job-type"

هو الـ attribute التي تم على اياها
تقسيم الـ sub-types

↳ Specialization and Generalization

→ Specialization (تخصص)

The process of defining one or more subtypes of the super type and forming super type / subtype relationship (Top - Down)

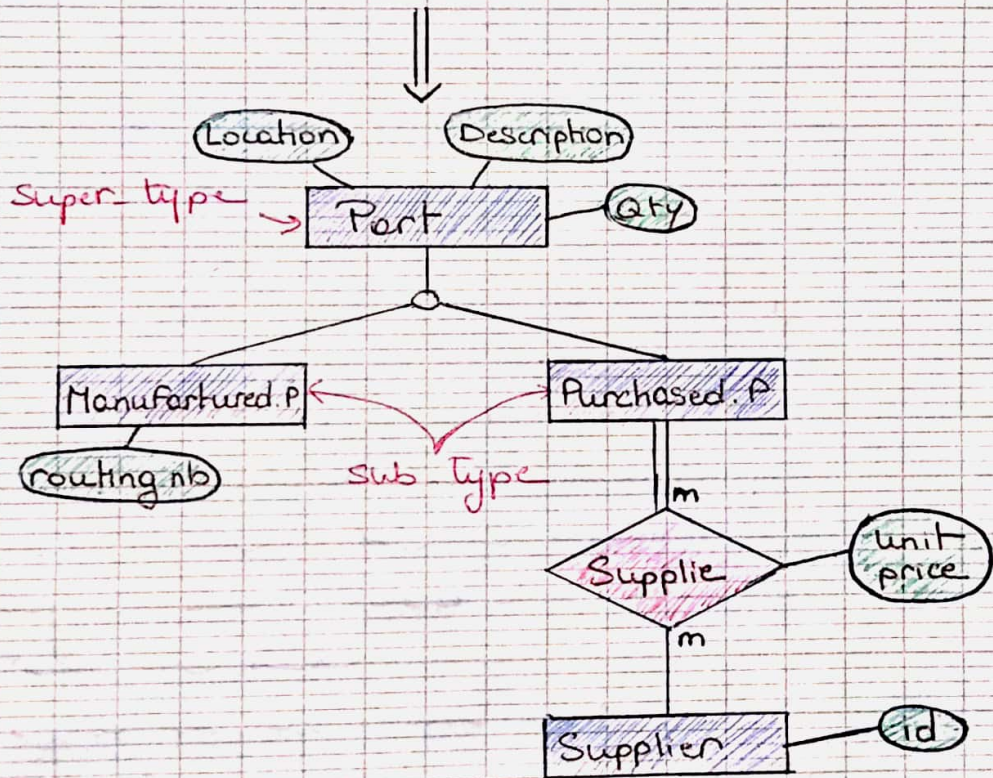
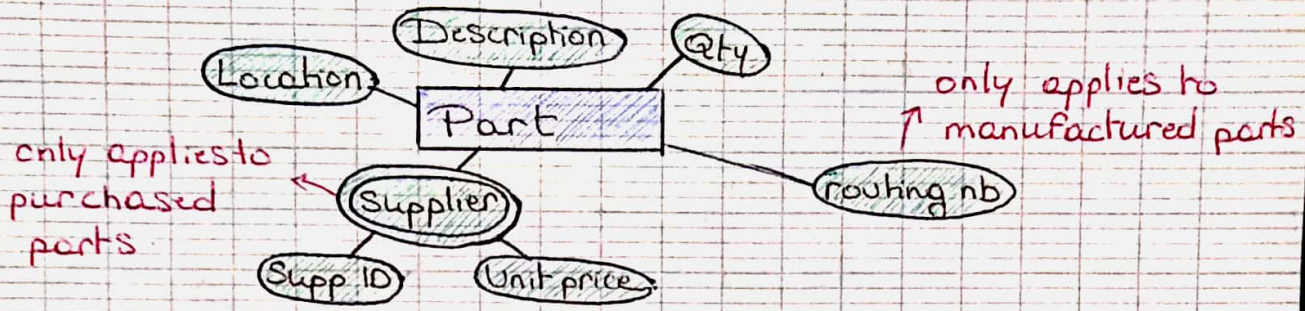
There are two reasons for specialization:

1. certain attributes may apply to some (but not all) instances of the super-type
2. some relationship may be participated only by some instances that are member of the sub-type

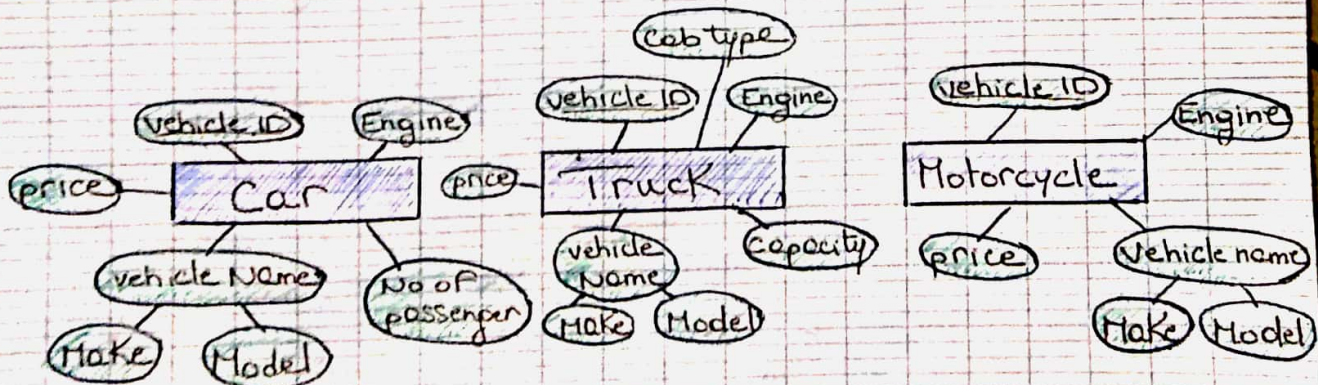
→ Generalization (تعميم)

The process of defining a more general entity from a set of more specialized type.
(Bottom - Up)

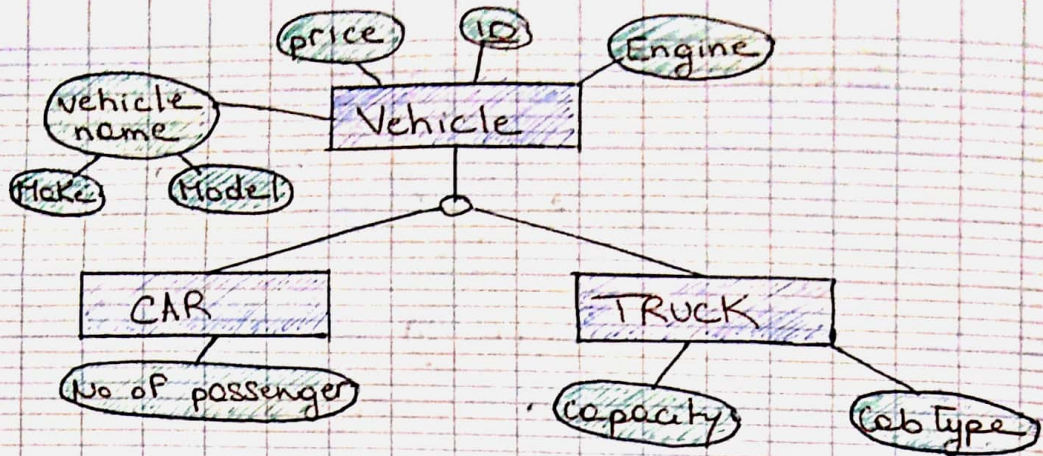
Example of Specialization



Example of Generalization



- The three entity type car, truck and motorcycle are vehicle types and have common attribute



N.B!!
 ار Motorcycle كـ تعبيرها Sub entity لأنها كـ تلك
 Attribute لأنها كـ تعبيرها

↳ Constraints in Supertype / Subtype relationship

1. Completeness Constraints

وهي القيود التي تحدد طريقة مشاركة أنواع الـ Super-type في العلاقة، حيث سأل "هل كل member المنتمي إلى الـ Super-type عليه أن ينتمي إلى واحد من الـ Sub-type على الأقل".

إن كانت الإجابة نعم تكون نتكم عن:

↳ **total specialization** (double line ==)

إن كانت الإجابة لا تكون نتكم عن:

↳ **Partial specialization** (single line —)

2. Disjointness Constraints:

↳ Disjoint Rule

An instance of the supertype can be only ONE of the subtype

↳ Overlap Rule

An instance of the supertype can be more than one of the subtype