UNIT 1. CONCEPTUAL MODELLING (EER)
Part 3 of 3: EER DIAGRAM
02/10/23

Bases de datos (BD)
CFGS Desarrollo de Aplicaciones Web (DAW)

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UNIT 1. CONCEPTUAL MODELLING (EER)

UNIT 1.3 EER DIAGRAM

1.3.1 Generalizations / Specializations

1.3.2 Aggregations

1.3.1 EER: Generalizations / Specializations

What is an extended ER diagram?

Extended entity-relationship models (EER) are conceptual models or advanced database diagrams very similar to normal ER diagrams.

In addition to the concepts covered by normal ER diagrams, EER diagrams include:

- Specialization and generalization
- Aggregations
- Category or type of union (beyond this module)

1.3.1 EER: Generalizations / Specializations

Generalizations / Specializations

The extended E/R introduces the concepts of generalization and specialization through a special relationship called "**is a**".

A specialization consists of dividing a **general entity** (also called super-entity, super-class or super-type) into more **specific entities** (also called sub-entities, sub-classes or sub-types). The splitting entities will share a set of attributes common to all entities, but **the sub-entities will have additional attributes** that are only valid for the new entities.

IMPORTANT: If ALL the specific entities have no attributes and no connection to any other element of the diagram, they should be represented as an attribute called "type" or so.
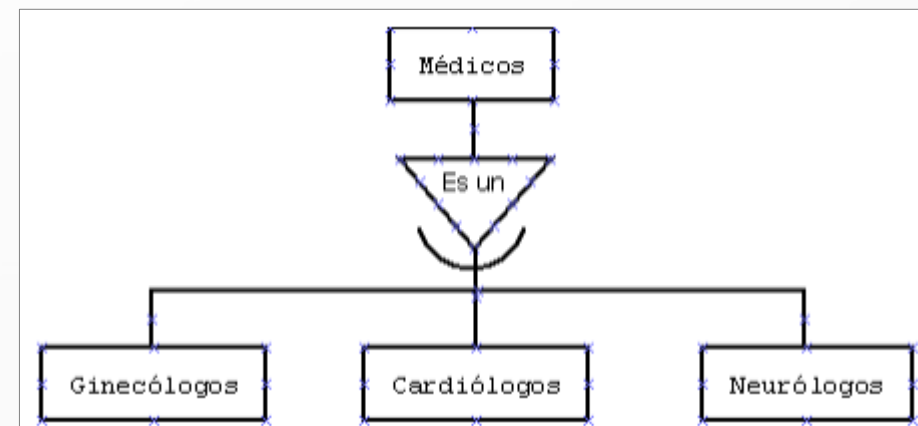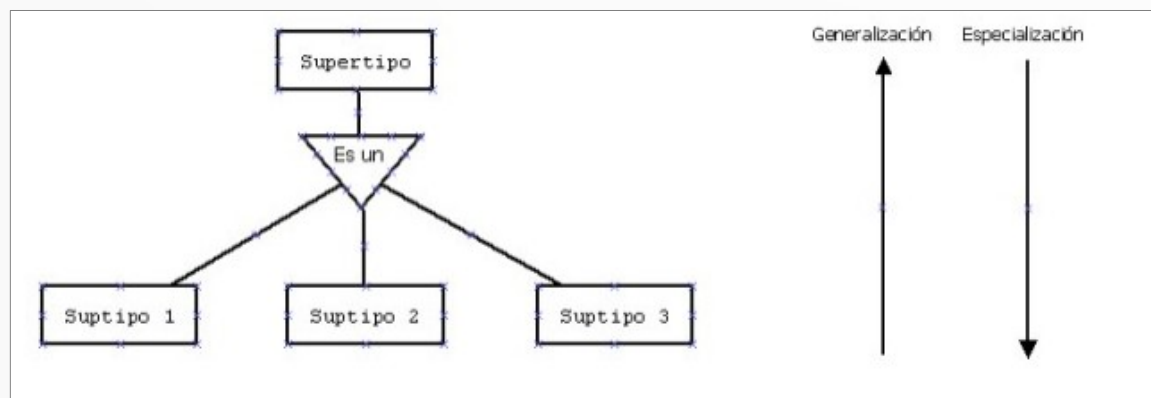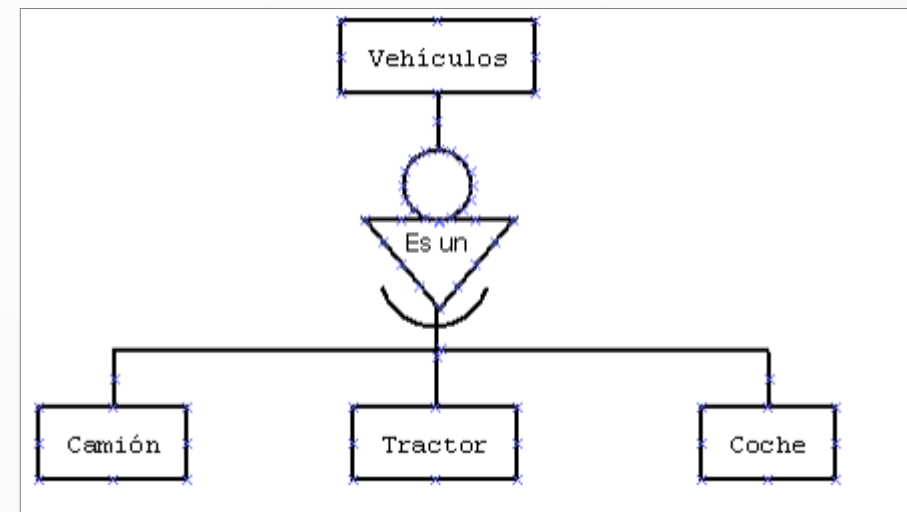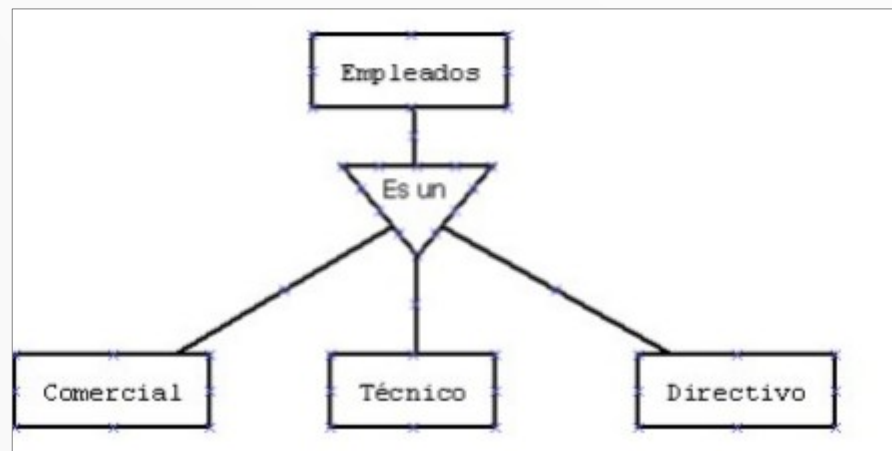
1.3.1 EER: Generalizations / Specializations

Generalizations / Specializations

This means the more **general entity is specialized** into one or more specialized entities or sub-classes, or conversely, that **one or more entities are generalized into a general entity or super-entity.**

This process can be repeated at different levels, it is possible for an entity to have more than one super-entity, as long as the most general entity of the set is unique.
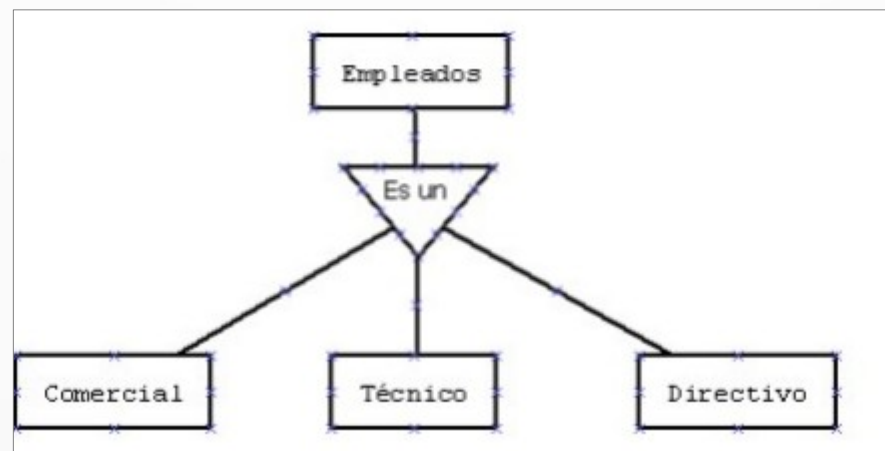
1.3.1 EER: Generalizations / Specializations

Generalizations / Specializations

EXAMPLE: Suppose we want to represent the employees of a company in which we can find three types of well-differentiated positions, on the one hand the commercial ones, on the other the technicians and finally the managers.

The way to present this context would be: the employees super-entity will have a set of attributes that will be common to the three sub-types and, in addition, each sub-type will have the attributes that are specific to that type of employee.
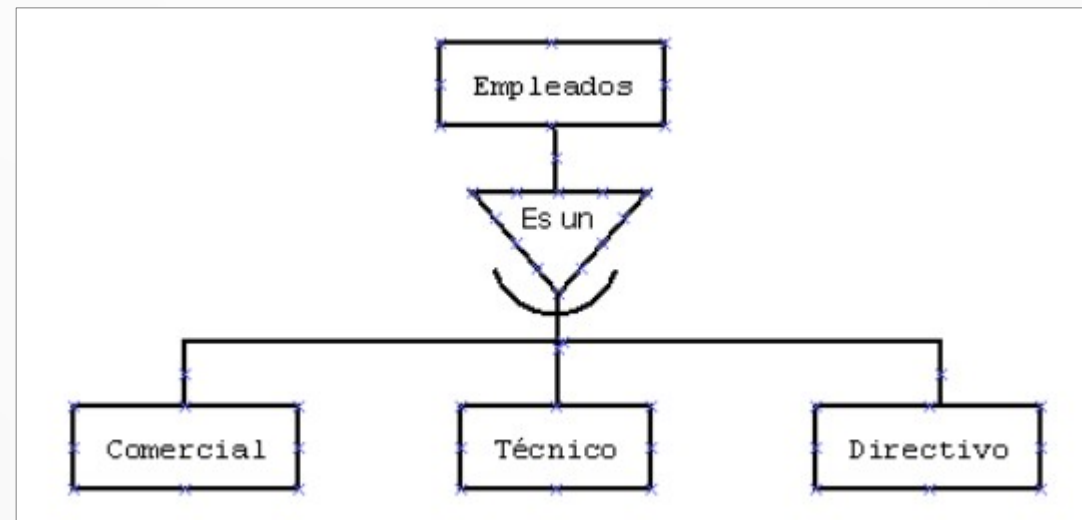
1.3.1 EER: Generalizations / Specializations

Generalizations / Specializations

CLASSICAL NOTATION

Disjoint (D) or Exclusive (*Spanish: disjunta D*)

This type of specialization means that each occurrence of the super-type can only belong to one of the sub-types.

There is no overlap. To represent this exclusivity, an arch is placed in the part of the sub-types.

*In this case, an Employee **can** be a Technician, or a Salesperson, or a Manager in an EXCLUSIVE way.*
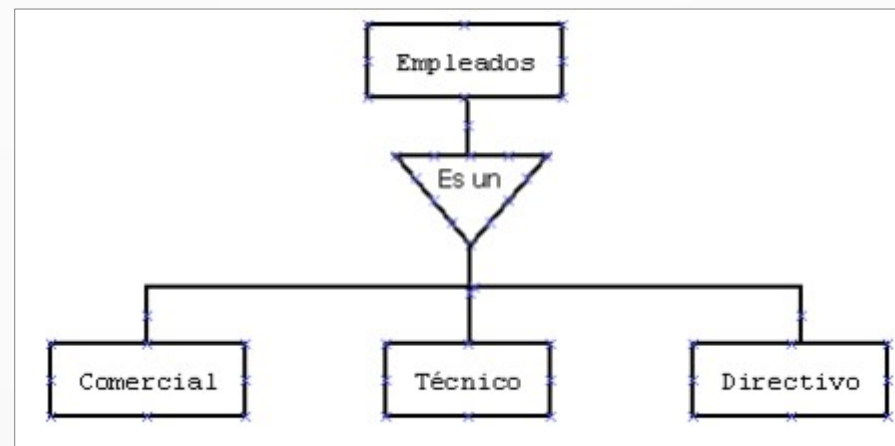
1.3.1 EER: Generalizations / Specializations

Generalizations / Specializations

CLASSICAL NOTATION

Overlapping (O) or Inclusive (*Spanish: solapada S*)

That is, an instance of the super-type can appear in more than one sub-type.

Overlaps allowed. The representation of this type of specialization is without including the arc in the relation.

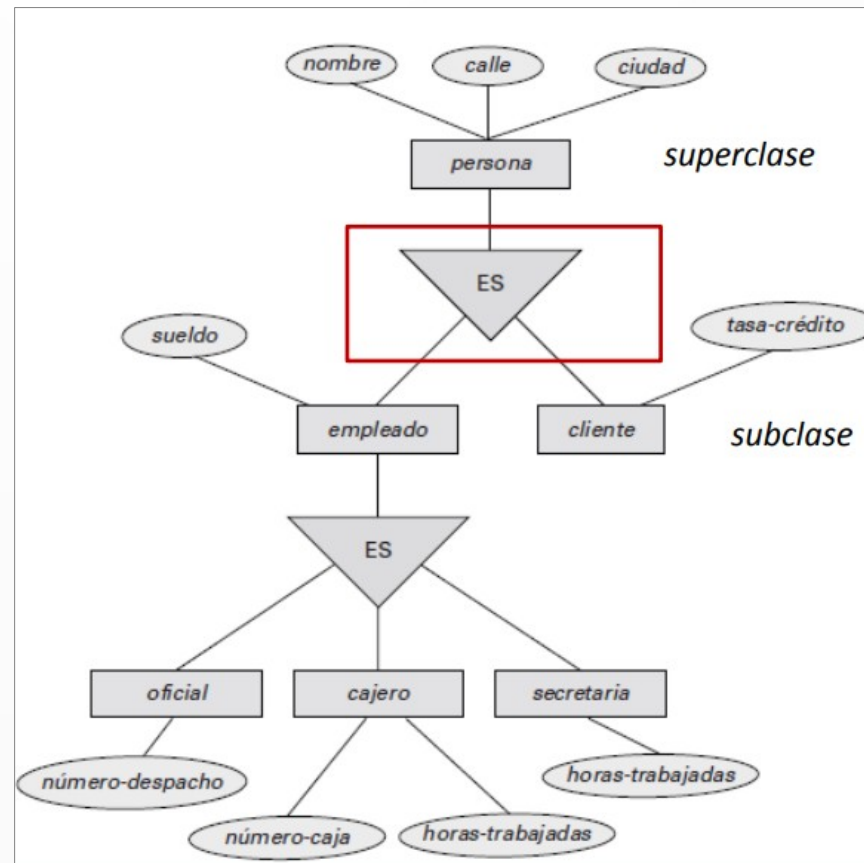*In this case, an Employee **can** be a Technician, or a Salesperson, or a Manager or more than one option.*

1.3.1 EER: Generalizations / Specializations

Generalizations / Specializations

CLASSICAL NOTATION

Mixing types

In this case, a person can be an employee or a customer and, only an employee can be an officer, a cashier or a secretary.
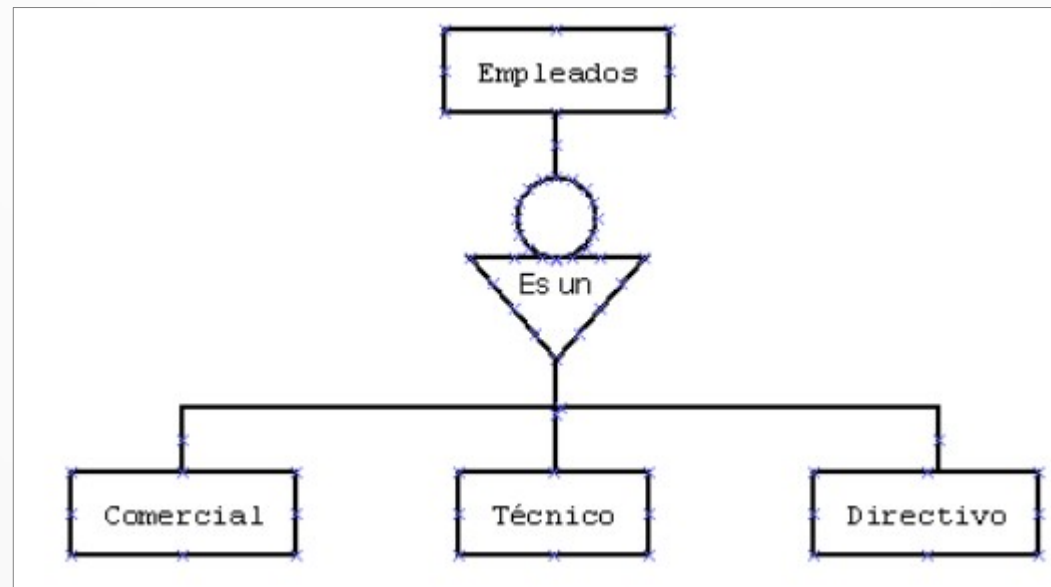
1.3.1 EER: Generalizations / Specializations

Generalizations / Specializations

Total (T)

This type of specialization requires every occurrence of the super-type must appear in one of the specializations.

In other words, we cannot have employees who are neither commercial, technical nor manager.

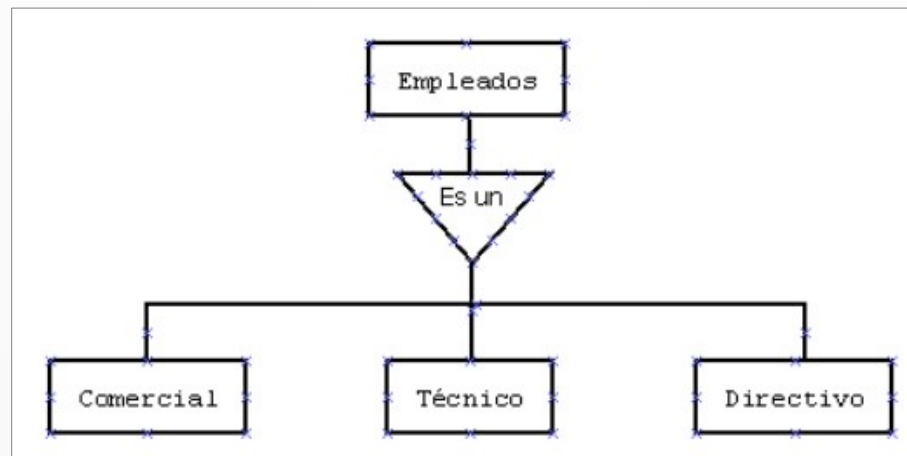**CLASSICAL NOTATION**

1.3.1 EER: Generalizations / Specializations

Generalizations / Specializations

CLASSICAL NOTATION

Partial (T)

This type of specialization indicates that there may be occurrences of the super-type that do not correspond to any of the occurrences of the sub-types.

==The graphical representation is the same as the one used in the first example, only the triangle.==

In other words, there may be employees who are neither commercial, nor technical, nor managers, for example a driver, cleaning staff, secretaries, etc.
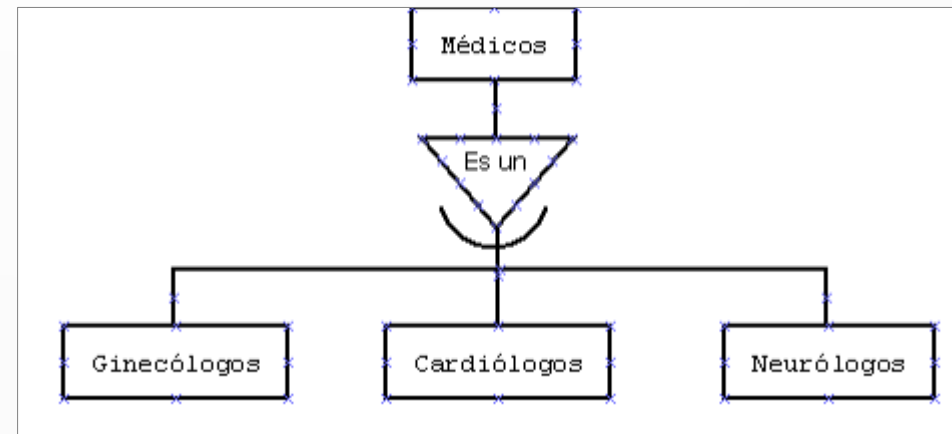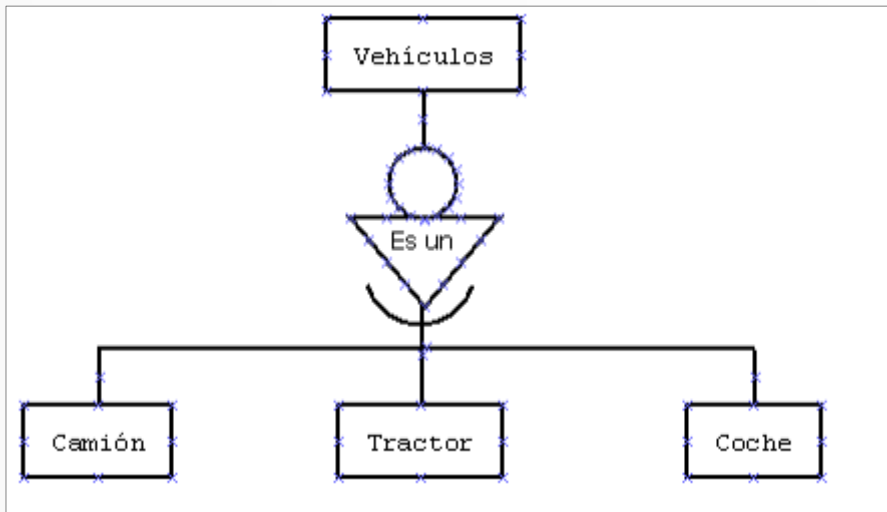
1.3.1 EER: Generalizations / Specializations

Generalizations / Specializations

CLASSICAL NOTATION

Try to guess these cases:

1.3.1 EER: Generalizations / Specializations

Generalizations / Specializations

CLASSICAL
NOTATION

Summary:

| Solapada Parcial | Solapada Total | Disjunta Parcial | Disjunta Total |

1.3.1 EER: Generalizations / Specializations

Generalizations / Specializations

The following ER diagram expresses, by means of LETTERS, that the employees of a company can specialize according to three criteria.
Explanation of the diagram. The employee gets specialized in:

- *PARTIAL (P): There will be employees who are not from those bodies.*
- *DISJOINT (D): An Engineer will not be an Administrative or Technician.*
- **UNSPECIFIED = PD = Can be a manager or not.**
- *TOTAL (T): All employees have a type of contract.*
- *OVERLAPPED (O): Some employees can belong to more than one body.*
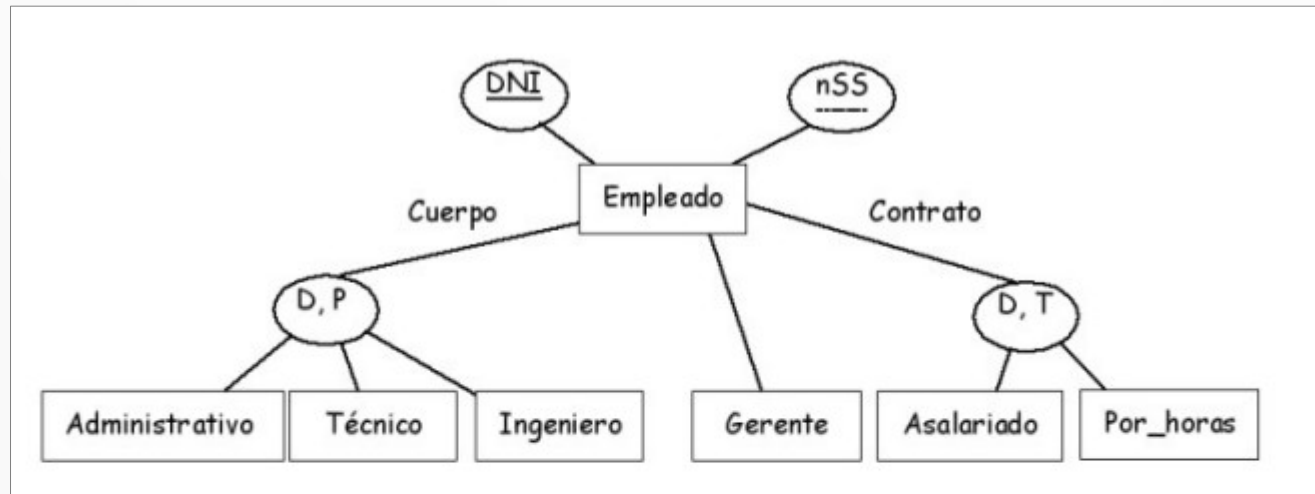
**ALTERNATIVE
NOTATION**

WARNING

UNIT 1. CONCEPTUAL MODELLING (EER)

UNIT 1.3 EER DIAGRAM

1.3.1 Generalizations / Specializations
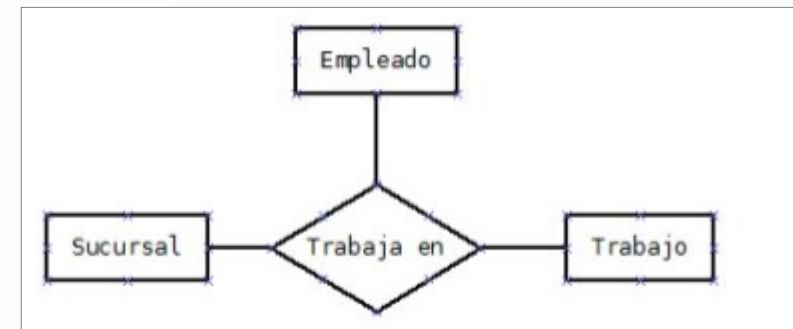
1.3.2 Aggregations

1.3.2 Aggregations

Aggregations

In the basic ER model there is no way to express a relationship between relationships or between a group of entities itself.

To overcome these limitations, the group/relationship is created with entity characteristics through a mechanism known as aggregation.

To express an aggregation, the elements that form it are included in a rectangle, implying that the set behaves as an identity.

*For example, suppose the following scheme refers to a bank branch.*

1.3.2 Aggregations

Aggregations

To add a manager to the branch you could think of adding him to the list of employees and creating the relationship "manages"…

But a broader vision allows us to see that the director manages both the employees and the jobs that are performed in the branch, therefore, the entire previous scheme can be understood as an aggregate entity with the relationship "manages" with a director.
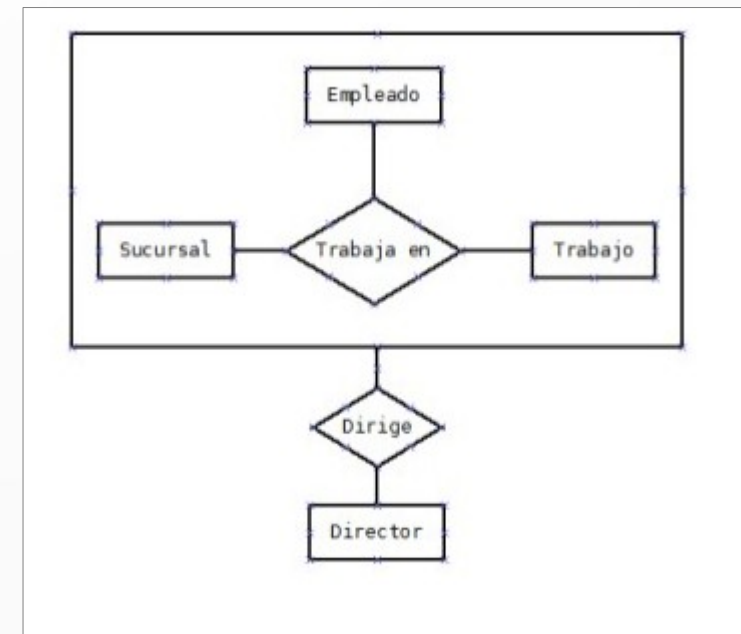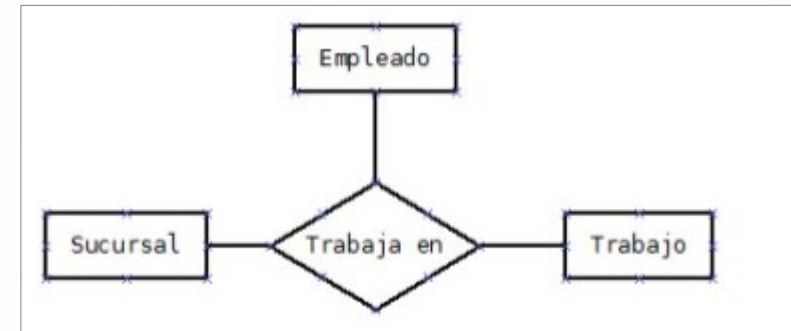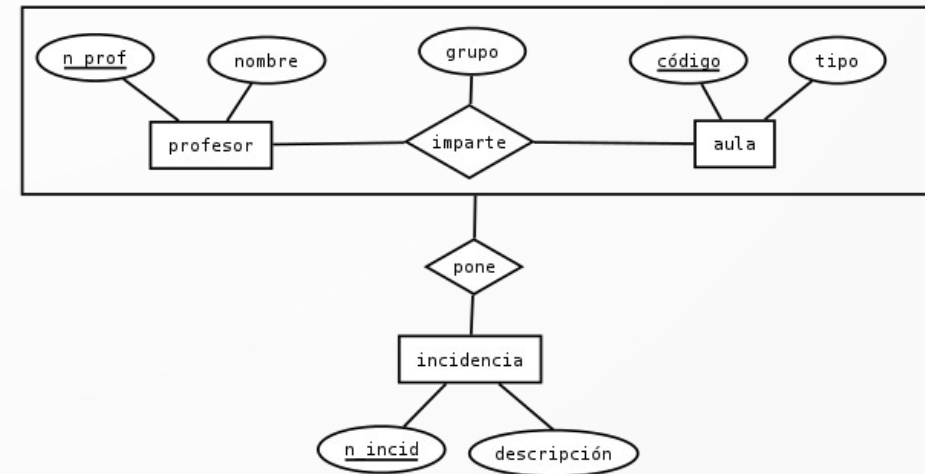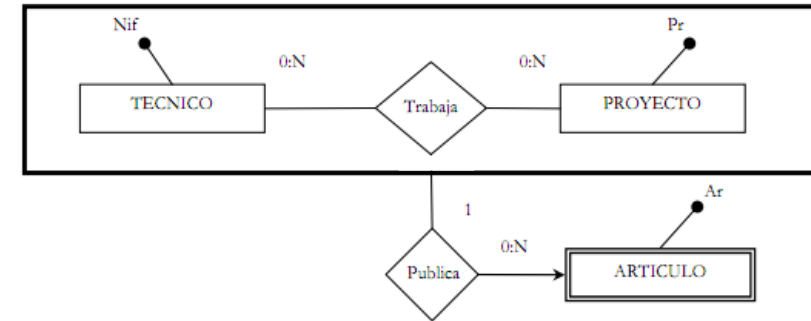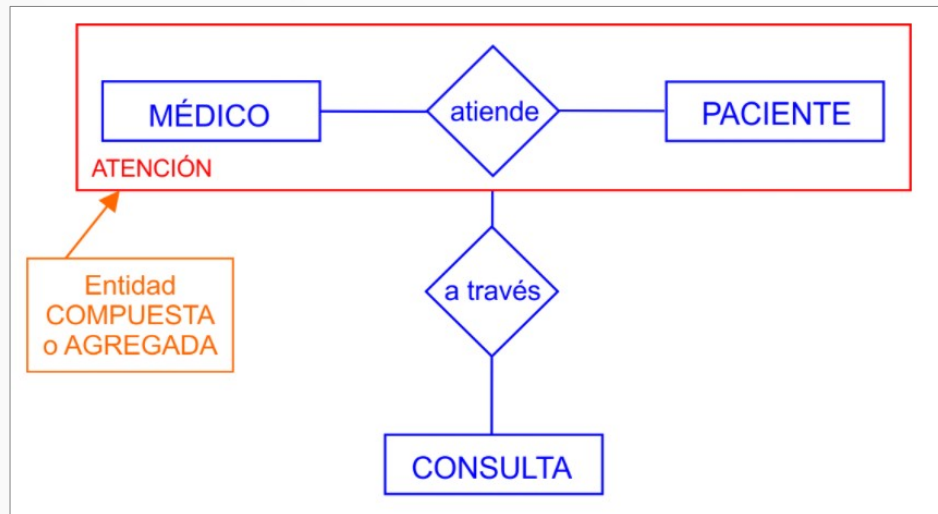
1.3.2 Aggregations

Ternary or aggregation?

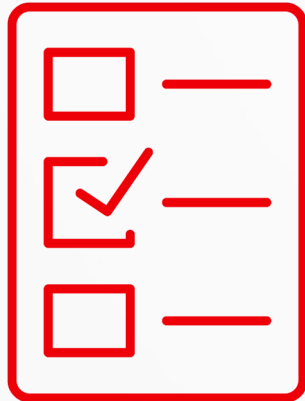Very often you will have to decide whether to create a ternary or an aggregation.

It will be aggregation if:
- Two of the three entities have been related before the third one arrives
- Two of the entities can be related without the participation of the third one

Example: https://www.abcsoftperu.com/descargas/curso02.html#mere

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BASES DE

WORKSHOP C: HIGH LEVEL ER

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UNIT 1
CONCEPTUAL MODELING (EER)

BASES DE DATOS 2022/2023
CFGS DAW

WORKSHOP D: VERY COMPLEX EER!

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