

# Database — Modeling : Entity Relationship Diagram (ERD) (Part 5)

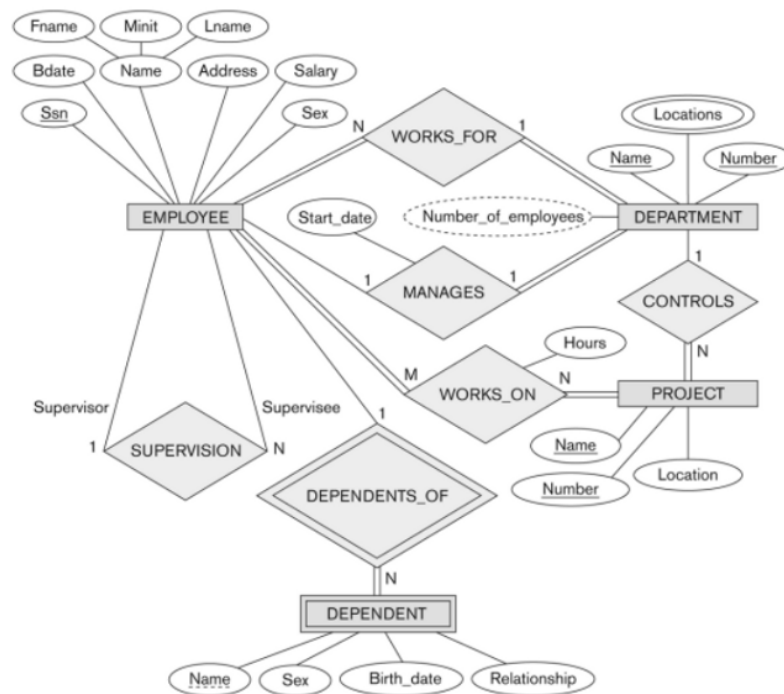
A common approach to sketch the entities and their relationships.



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**Let's take an example of a company database**



ERD of a company database — Images were taken from Fundamentals of Database Systems by Ramez Elmasri.

*Wish you already came along the last part Database — Database Design: Conceptual Design (Part 4)*

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## Entity Relationship Diagram

An entity relationship model, also called an entity-relationship (ER) diagram, is a graphical representation of entities (which will become your tables) and their relationships to each other.

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*Database modeling is the process of creating a data model.*

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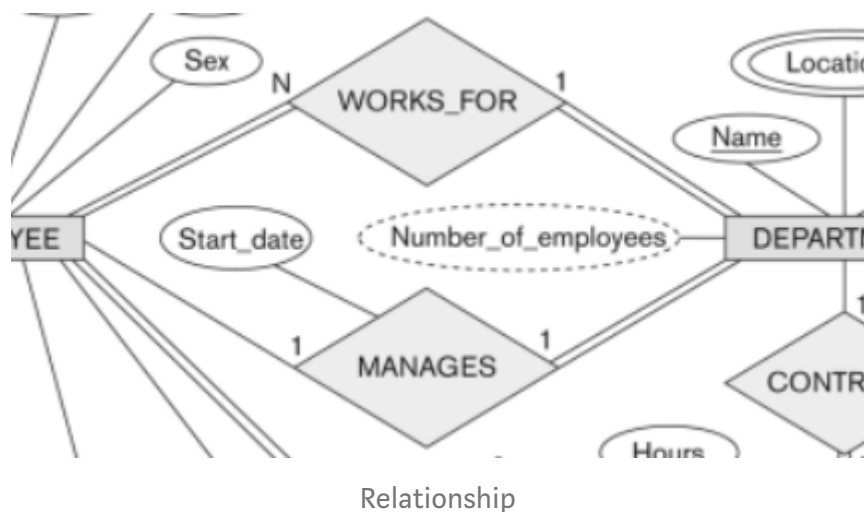
## Entity

A simple rectangular block represents a table.



## Relationship

It's sketched using the diamond shape.



You can sketch the type of the relationship, whether one-to-many using “1-M” , or many-to-many using “M-N”, or one-to-one using “1-1”.

The lines connecting an entity with a relationship whether single or double line refer to another constrain (we talked about earlier) called “Existence Dependency Constraint” (also called “Participation Constraint”).

So, for example, if an employee **must** work for a department, this sketched by double lines, and called “total or mandatory participation”. And if an employee **may or may not** manage a department, this is sketched by a single line and called “partial or optional participation”.

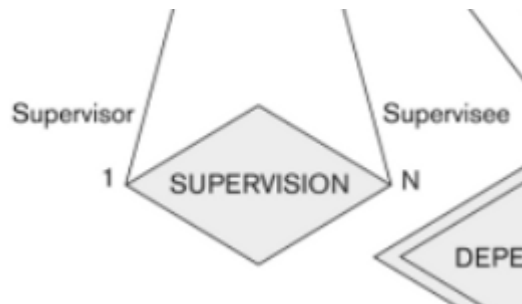
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*A relationship itself can have attributes. In which table we will include these attributes will be discussed in Database Mapping in the next tutorial.*

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## — Recursive Relationship

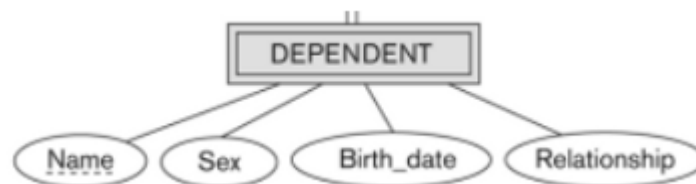
It's a relationship with the the same entity. For example, an employee may act as a *supervisor* for one or more employees, while an employee may be *supervised* by an employee (it's one-to-many relationship).



Recursive Relationship

## Weak Entity

A weak entity is simply an entity where it's existence depends on another entity. You can't logically have dependent(son, daughter, ..etc.) with the absence of the employee table. It's sketched same as a normal entity but wit double lines.



Weak Entity

## — Partial Key

A weak entity has what's called a "partial key". It's one or more attributes that uniquely identify a weak entity for a given owner entity. In our example, the dependent *name* is unique for every employee.

It's sketched the same as a normal attribute, but, with dashed underline.

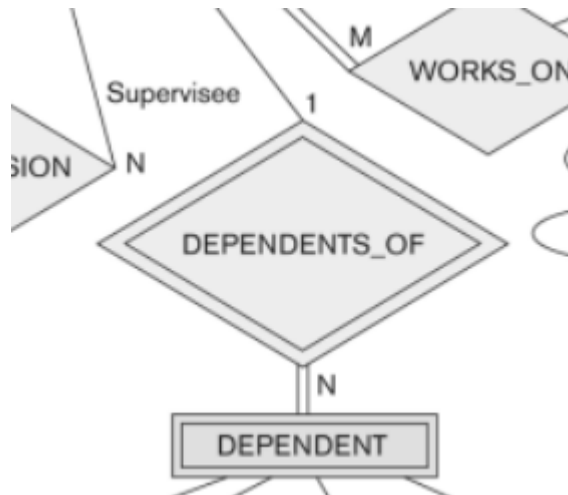
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*It's called partial because it can't be a primary key on it's own, it needs another column, which is the foreign key of the owner entity. This will be discussed in Database Mapping in the next tutorial.*

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## — Weak Entity Relationship

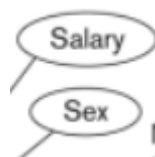
Also whenever there is a relationship between a weak entity and another entity, it's sketched same as the one above, but with double lines.



Weak Entity Relationship

## Attribute

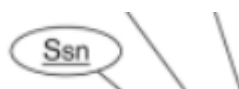
An attribute or a column (simple) represents a piece of data in the table, like an address, salary, and date.



Attribute

## Primary Key

It's sketched the same as a normal attribute, but, with underline.



Primary Key

## Composite Attribute

A value that composed of some other values, for example, you may have name that's composed of (*first name, middle name, and last name*).





Composite Attribute

*We don't define one column for name (if it's composite), instead we split it up into simple separate columns; first name, last name. One reason is because you may do something different with the last name(or first name), and you want to get to it by itself. This will be discussed in Database Mapping in the next tutorial.*

## Multi-valued Attribute

Multiple values for a single column, for example the locations of a department may have more than one value at the same time.

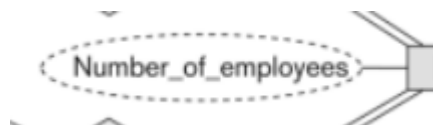


Multi-Valued Attribute

*Multi-valued attributes will be extracted in another table. This will be discussed later in Database Mapping.*

## Derived Attribute

When you have a column where it's value could be calculated from another column. Thus, there is no need to insert it's value every time. For example, we can know the number of employees work on a specific department by counting the number of rows.



Derived Attribute

This will be done automatically by the DBMS, and it will lead to having a consistent values rather than accidentally inserting a wrong value.

## Symbols Summary

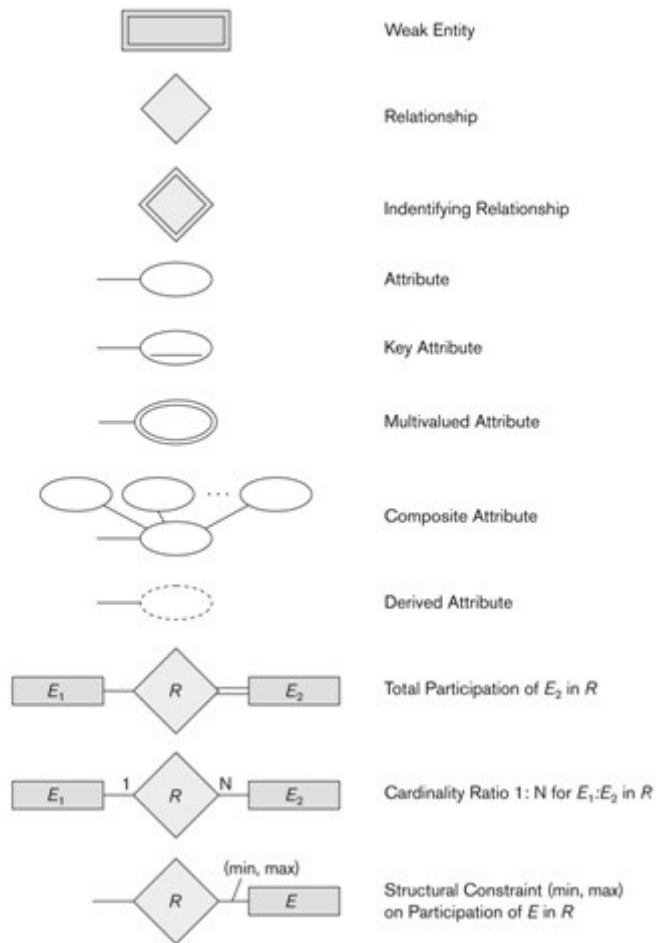
Here is a summary for all the symbols in the ERD.

Symbol



Meaning

Entity



## Wrapping Up

Using the entity relationship diagram to sketch your database is a common way to visualize your tables, columns, and their relationship.

Now, It's time to translate the entities, relationships, multi-valued attributes, into actual tables. Next is the “Logical Design (Data Model Mapping)”.