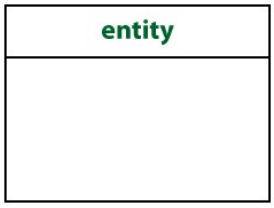
ERD: Crow's Foot Notation

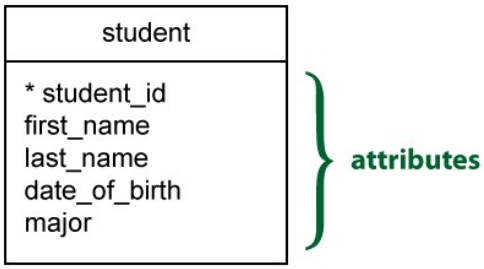
The beginning of crow's foot notation dates back to an article by GORDON EVEREST (1976, Fifth Computing Conference, IEEE). The notation naming convention was changing; in fact, it had been evolving over several years.

Symbols in Crow's Foot Notation
Let's now take a look at the representation of entities and relationships in crow's foot notation.

Entities
Definition:
An entity is a representation of a class of object. It can be a person, place, thing, etc. Entities usually have attributes that describe them.
In crow's foot notation, an entity is represented by a rectangle, with its name on the top. The name is singular (entity) rather than plural (entities).



Attributes
Definition:
An attribute is a property that describes a particular entity.

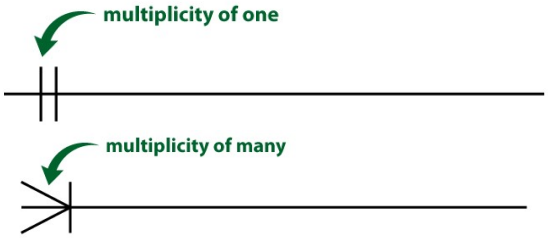


The attribute(s) that uniquely distinguishes an instance of the entity is the identifier. Usually, this type of attribute is marked with an asterisk or underlined.

Relationships
Definition:
Relationships illustrate the association between two entities. They are presented as a straight line. Usually, each relationship has a name, expressed as a verb, written on the relationship line. This describes what kind of relationship connects the objects.
Note that the mentioned type of relationship is binary. In the Entity-Relationship model, representing a ternary or higher order of relationship is problematic.

Cardinality:
Relationships have two indicators. These are shown on both sides of the line.

- The first one (often called multiplicity) refers to the *maximum* number of times that an instance of one entity can be associated with instances in the related entity. It can be one or many.



- The second describes the *minimum* number of times one instance can be related to others. It can be zero or one, and accordingly describes the relationship as optional or mandatory.

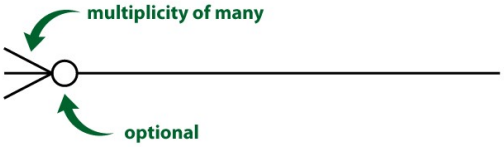
The combination of these two indicators is always in a specific order. Placed on the outside edge of the relationship, the symbol of multiplicity comes first. The symbol indicating whether the relationship is mandatory or optional is shown after the symbol of multiplicity.

In crow's foot notation:

- A multiplicity of one and a mandatory relationship is represented by a straight line perpendicular to the relationship line.
- A multiplicity of many is represented by the three-pronged 'crow-foot' symbol.
- An optional relationship is represented by an empty circle.

Finally, there are four possible edges to the relationship, illustrated here:

- zero or many



- one or many

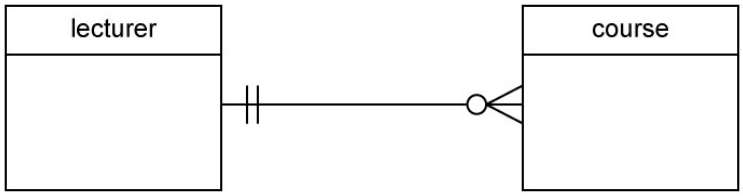
- one and only one

- zero or one

Relationship degrees make them readable as :

- One-to-one

- One-to-many



- Many-to-many