ENTITY-RELATIONSHIP MODELLING

Entity-relationship (**ER**) modelling is a simple method of expressing the design of database. ER modelling was first proposed by Chen in 1976, and it has emerged as the dominant modelling technique only in the past 15 years.

The features of the ER diagram include:

Rectangles:

Represent entities, the objects being modelled. Each entity is labelled by a noun.

Ellipses:

Represent attributes that describe an entity. Underlined attributes are primary keys that uniquely identify instances of the entity.

Lines between rectangles and ellipses:

Connect attributes to entities. These lines are never labelled.

Diamonds:

Represent relationships between entities; a relationship is labelled with a descriptive title (a verb) that explains how the entities interact.

Lines between rectangles and diamonds:

Connect entities to relationships. Lines may be annotated, which means that the two ends can be marked with an M and an N, an M and a 1, an N and a 1, or a 1 and a 1. Annotations indicate the cardinality of the relationship, discussed later in this section.

Working steps:

1st step: **Identifying entities** in ER modelling

The first step in the ER modelling process is to identify the entities from the requirements of the system.

Entities are objects or things that can be described by their characteristics. As you identify entities, you list the attributes that describe the entity. For example, a customer is an entity that has a name, an address, a phone, and other details.

2nd step: **Identifying relationships** in ER modelling

The second step consists to identify the relationships between entities.

Let's explore the possible types of relationship or cardinalities that can exist.

Cardinality refers to the three possible relationships between two entities:

One-to-one:

A one-to-one relationship is represented by a line labelled with a 1 at each end that joins two entities. One-to-one means that for the two entities connected by the line, there is exactly one instance of the first entity for each one instance of the second entity.

One-to-many (or many-to-one):

A one-to-many relationship is represented by a line annotated with a 1 and an M (or a 1 and an N). One-to-many means that for the two entities connected by the line, there are one or more instances of the second entity for each one instance of the first entity. From the perspective of the second entity, any instance of the second entity is related to only one instance of the first entity.

Many-to-many:

A many-to-many relationship is represented by a line annotated with an M and an N. Many-to-many means that for the two entities connected by the line, each instance of the first entity is related to one or more instances of the second entity and, from the other perspective, each instance of the second entity is related to one or more instances of the first entity.