

# 1 Entity Relationship Model

An *entity* exists in a mini-world. An entity relationship (ER) model defines relationships between entities.

Examples: PROFESSOR has 0 or more STUDENT. STUDENT has 0 or more ASSIGNMENT.

These decisions have to be taken before the database is created.

Attributes are characteristics of entities. Each attribute has its *value*, with a certain data type.

Attributes can be simple (e.g.: an ID number), composite (e.g.: an address with number, street, city, state etc.) or multi-valued (e.g.: previous addresses). Attributes can also be calculated.

In a diagram, there are shapes for objects: an entity is represented by a rectangle with capital letters; a relationship by a diamond; and an attribute by an oval. *Keys* have underlines under their name. Concentric ovals are multi-valued attributes.

An entity CAR, for example, can be represented by a specific entity (e.g.: John's car.) The current set of specific entities in a given type is the state of the entities.

Each edge in the diagram is read "name  $\rightarrow$  line  $\rightarrow$  relationship  $\rightarrow$  number." If lines are not double, we read "may take..."

A *weak entity* cannot be distinguished by its attributes. It must have an identifying relationship.

Relations can be recursive.

*Discriminators* are not strong enough to be a key.