Topic 2.2: Data Model Basic Building Blocks

The basic building blocks of the Entity Relationship Diagram data model are entities, attributes, and relationships.

An entity is anything, such as a person, place, thing, or event, about which data are to be collected and stored. Entities may be physical objects such as customers or products. But entities may also be abstractions such as flight routes or musical concerts. An attribute is a characteristic of an entity.

Example: A CUSTOMER entity would be described by attributes such as customer last name, customer first name, customer phone, customer address, and customer credit limit. The attributes are the equivalent of fields in file systems.

A relationship describes an association among (two or more) entities. For example, a relationship between customers and agents might be described as “an agent can serve many customers and each customer might be served by one agent.” Data models use three types of relationships:

- **One-to-many (1:M) relationship**: A painter paints many different paintings, but each one of them is painted by only one painter. Thus, the painter (the “one”) is related to the paintings (the “many”). Therefore, Database designers label the relationship “PAINTER paints PAINTING” as a 1:M, see Figure 2.6 below.

![Figure 2.6 Relationships: The Basic Chen ERD](image)
• **Many-to-many (M:N) relationship:** An employee might learn many job skills, and each job skill might be learned by many employees. Database designers label the relationship “EMPLOYEE learns SKILL” as M:N, see Figure 2.6.

• **One-to-one (1:1) relationship:** A retail company’s management structure may require that each one of its stores be managed by a single employee. In turn, each store manager – who is an employee – only manages a single store. Therefore, the relationship “EMPLOYEE manages STORE” is labeled 1:1, see Figure 2.6.

**Concept Check**

What are building blocks of data modeling? Explain each one with an example.

What are the three different types of relationships? Give examples.