Conceptual Model

Ortiz Vega Angelo
Course Code: CE3101
Name: Databases.
Academic Area of Computer Engineering.
Cartago, Costa Rica.

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-Content:

Database Design Process:

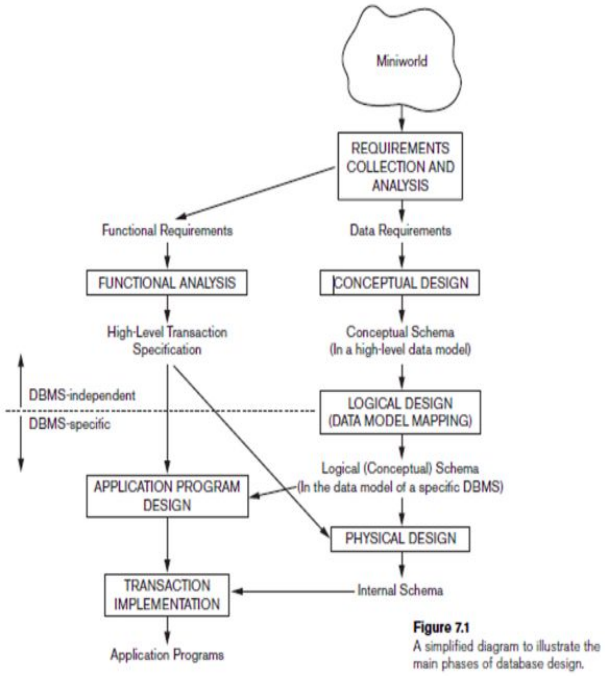


Figure 7.1
A simplified diagram to illustrate the main phases of database design.

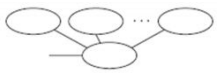
Entities and Attributes:

- The basic object that the ER Model represents is an **entity,** which is a thing in the real world with an independent existence.
- Each entity has **attributes.** Particular properties that describe it.

Entity: The basic object that the ER Model represents is an **entity,** which is a thing in the real world with an independent existence. Representation:

Attributes: Each entity has **attributes.** Particular properties that describe it. Representation:

Composite Attributes: Attribute divided into smaller parts. Represents more basic attributes with independent meanings. Representation:



Singled-Valued Attributes: Has a single value for a particular entity. Representation:

Multivalued Attributes: Can have a set of values for the same entity. Representation:

Stored and Derived: In some cases, two or more attributes values are related. **Stored:** Attribute that has the value. **Derived:** Attribute that depends on another attribute to assign a value.

Null Values: In some cases, a particular entity may not have an applicable value for an attribute.

Key Attributes: Uniqueness constraint. One or more attributes whose values are distinct for each individual entity in the entity set.

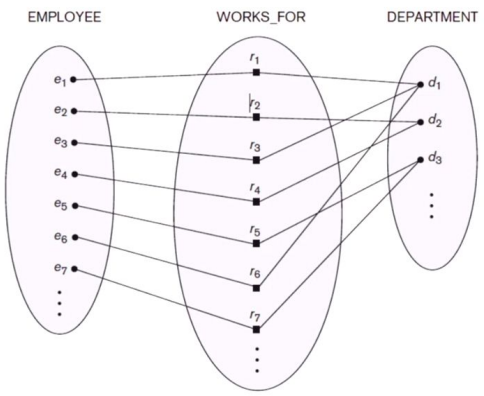
RelationShip Types, Relationships Sets, Roles and Structural Constraints.

Entity Type : An entity is an object that exists and is distinguishable from other objects. An entity may be **concrete** (a person or a book, for example) or **abstract** (like a holiday or a concept).

Entity Sets: An entity set is a set of entities of the same type (e.g., all persons having an account at a bank). Entity sets need not be disjoint.

Relationship: Whenever an attribute of one entity refers to another entity type, some relationship exists. In the ER model, these references should not be represented as attributes but as relationships. Symbol:

Relationship Types: A relationship type R among n entity types defines a set of associations among entities from these entity types. E1, E2, E3,... En. Example:

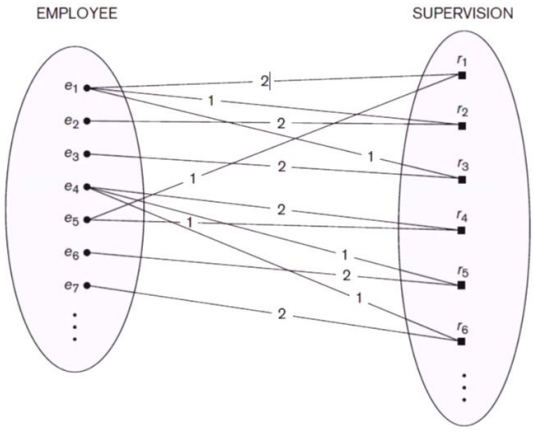


Degree of a Relationship Type: The degree of a relationship type is the number of participating entity types. A relationship type of degree two is called **binary,** and one of degree three is called **ternary.**

Role Name and Recursive Relationships:

a. **Role Name:** Helps to explain what the relationship means. Role that the participating entity plays in a relationship instance.
b. **Recursive Relationship:** The same entity participates more than once in a relationship.

Example of Role Name and Recursive Relationships:

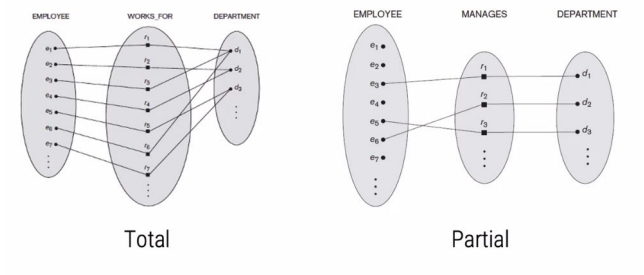


Constraints on Binary Relationship Types:

- Relationship types usually have certain constraints that limit possible combinations of entities that may participate in the corresponding relationship set.
- These constraints are determined from the miniworld situation that the relationships present.
- We can distinguish two many types of binary relationship constraints:
    - Cardinality radio: Specifies the maximum number of relationship instances that an entity can participate in.
    - Participation:

Participation Constraints and Existence Dependencies:

Specifies when the existence of an entity depends on being related to another entity. There are two types of participation constraints:



Attributes of Relationship Types: Relationship types can also have attributes, similar to those of entity types.

Notice that attribute of 1:1 or 1:N relationships types can be migrated to one of the participating entity types.

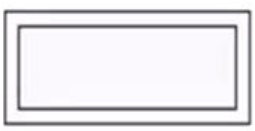
Weak Entity Types:

Entity Types that do not have key attributes of their own.

A weak entity type always has a total participation constraint (existence dependency) with respect to its identifying relationship because a weak entity cannot be identified without an owner entity.

Both a weak entity type and its identifying relationship are distinguished by surrounding their boxes and diamonds with double lines.

Representation:



Proper Naming of Schema Constructs:

- We choose to use singular names for entity types, rather than plural ones, because the entity type name applies to each individual entity belonging to that entity type.
- In our ER diagrams, we will use the convention that entity type and relationship type names are uppercase letters, attribute names have their initial letter capitalized.
- As a general practice, given a narrative description of the database requirements:
    - The nouns appearing in the narrative tend to give rise to entity type names.
    - The verbs tend to indicate names of relationships types.
    - Attribute names generally arise from additional nouns that describe the nouns corresponding to entity types.