

INTRODUCTION TO ER MODEL

ER model is represents real world situations using concepts, which are commonly used by people. It allows defining a representation of the real world at logical level.ER model has no facilities to describe machine-related aspects.

In ER model the logical structure of data is captured by indicating the grouping of data into entities. The ER model also supports a top-down approach by which details can be given in successive stages.

Entity: An entity is something which is described in the database by storing its data, it may be a concrete entity a conceptual entity.

Entity set: An entity set is a collection of similar entities.

Attribute: An attribute describes a property associated with entities. Attribute will have a name and a value for each entity.

Domain: A domain defines a set of permitted values for a attribute

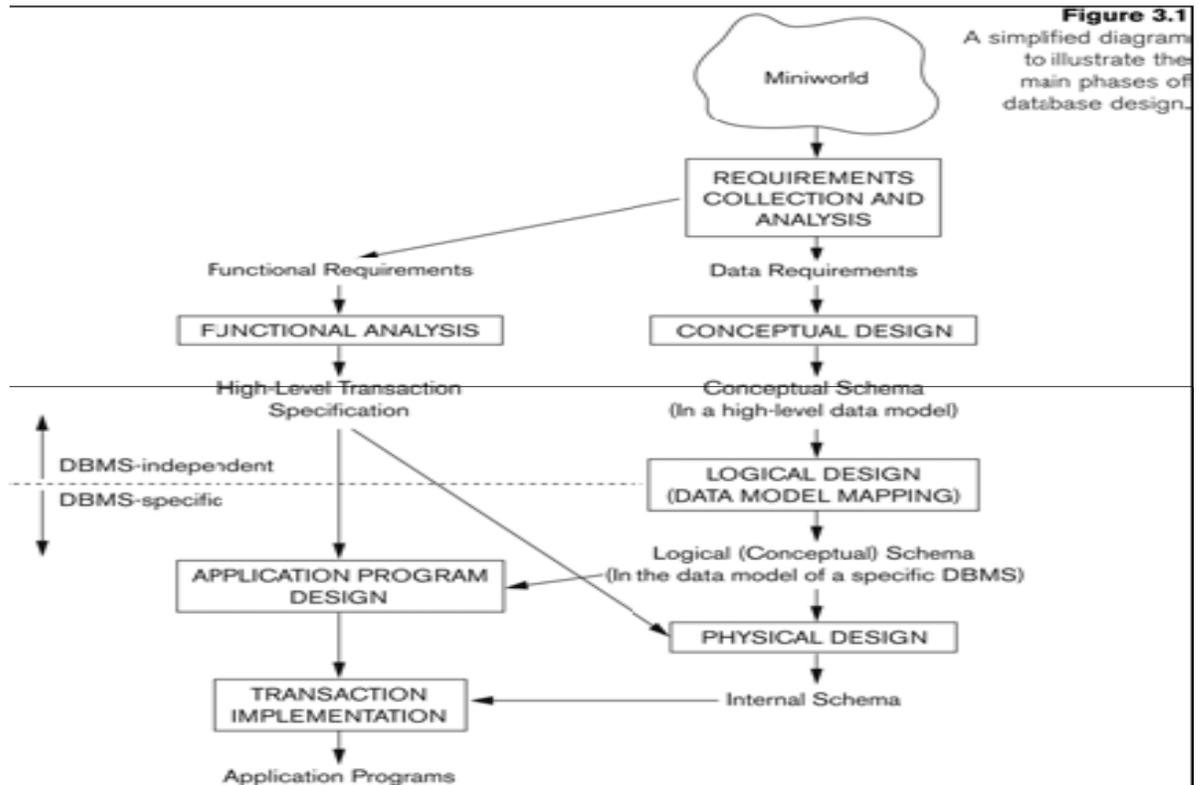
SYMBOLS IN E-R DIAGRAM

The ER model is represented using different symbols as shown in Fig .a

Figure 3.14
Summary of the notation for ER diagrams.

Symbol	Meaning
	Entity
	Weak Entity
	Relationship
	Identifying Relationship
	Attribute
	Key Attribute
	Multivalued Attribute
	Composite Attribute
	Derived Attribute
	Total Participation of E_2 in R
	Cardinality Ratio 1 : N for E_1, E_2 in R
	Structural Constraint (min, max) on Participation of E in R

Overview of Database Design Process



Example COMPANY Database

We need to create a database schema design based on the following (simplified) **requirements** of the COMPANY Database:

The company is organized into DEPARTMENTS.

Each department has a name, number and an employee who *manages the department*.

We keep track of the start date of the department manager.

A department may have several locations.

Each department *controls a number of*

PROJECTS. Each project has a unique name, unique number and is located at a single location.

We store each EMPLOYEE's social security number, address, salary, sex, and birth date.

Each employee *works for one department but may work on several projects*.

We keep track of the number of hours per week that an employee currently works on each project.

We also keep track of the *direct supervisor of each* employee.

Each employee may *have a number of* DEPENDENTS.

For each dependent, we keep track of their name, sex, birth date, and relationship to the employee.

ER Model Concepts

Entities and Attributes

Entities are specific objects or things in the mini-world that are represented in the database.

For example the EMPLOYEE John Smith, the Research DEPARTMENT, the ProductX PROJECT.

Attributes are properties used to describe an entity.

For example an EMPLOYEE entity may have the attributes Name, SSN, Address, Sex, BirthDate .

A specific entity will have a value for each of its attributes.

For example a specific employee entity may have Name='John Smith', SSN='123456789', Address ='731, Fondren, Houston, TX', Sex='M', BirthDate='09-JAN-55'

Each attribute has a *value set (or data type) associated with it* – e.g. integer, string, subrange, enumerated type,

Types of Attributes

There are two types of Attributes

Simple

Each entity has a single atomic value for the attribute.

For example, SSN or Sex.

Composite

The attribute may be composed of several components. For example:

Address(Apt#, House#, Street, City, State, ZipCode, Country), or Name(FirstName, MiddleName, LastName).

Composition may form a hierarchy where some components are themselves composite.

Multi-valued

An entity may have multiple values for that attribute. For example, Color of a CAR or Previous Degrees of a STUDENT.

Denoted as {Color} or {Previous Degrees}.

In general, composite and multi-valued attributes may be nested arbitrarily to any number of levels, although this is rare.

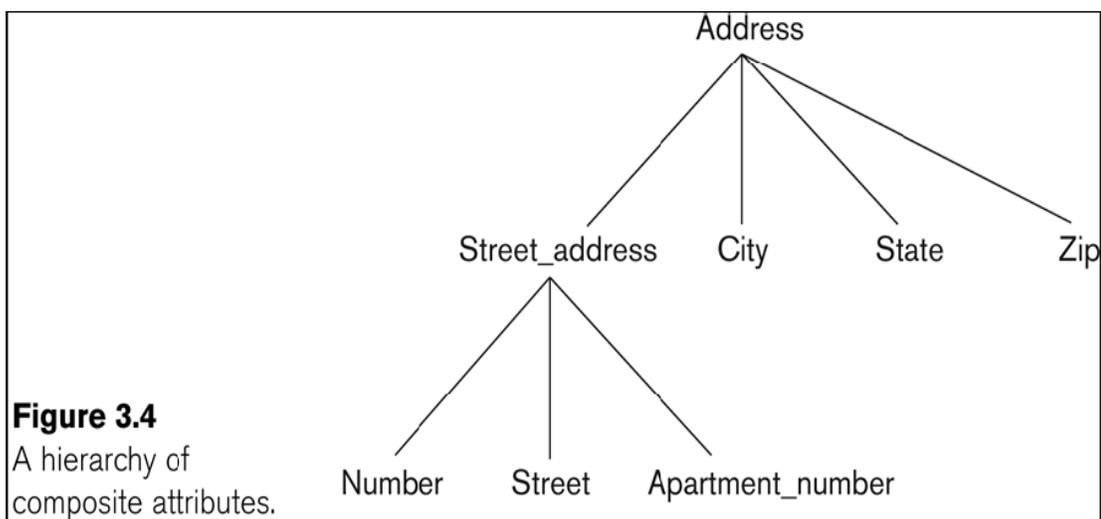
For example, Previous Degrees of a STUDENT is a composite multi-valued attribute denoted by

{Previous Degrees (College, Year, Degree, Field)}

Multiple Previous Degrees values can exist. Each has four subcomponent attributes:

College, Year, Degree, Field

Example of a composite attribute



Entity Types and Key Attributes

Entities with the same basic attributes are grouped or typed into an entity type.
For example, the entity type EMPLOYEE and PROJECT.

An attribute of an entity type for which each entity must have a unique value is called a key attribute of the entity type.

For example, SSN of EMPLOYEE.

A key attribute may be composite.

Vehicle Tag Number is a key of the CAR entity type with components (Number, State).

An entity type may have more than one key.

The CAR entity type may have two keys:

VehicleIdentificationNumber (popularly called VIN)

VehicleTagNumber (Number, State), license plate number.

Each key is underlined

Displaying an Entity type

In ER diagrams, an entity type is displayed in a rectangular box

Attributes are displayed in ovals.

Each attribute is connected to its entity type

Components of a composite attribute are connected to the oval representing the composite attribute.

Each key attribute is underlined.

Multivalued attributes displayed in double ovals.