

# A REVIEW OF “THE ENTITY-RELATIONSHIP MODEL”

## **Personal summarize**

The entity-relationship model can be used as a basis for unification of different views of data. It is the generalization or extension of existing models like network model, relational model and entity set model. It combined most of the advantages of the above three models. The entity-relationship model can achieve a high degree of data independence and is based on set theory and relation theory.

## **Generalization of the article**

This paper is organized into three parts.

Part 1 introduces the entity-relationship model using a framework of multilevel views of data. Part 2 describes the entity-relationship diagram and inclusion of semantics in data description and manipulation.

Part 3 analyzes the network model, the relational model, and the entity set model, and describes how they may be derived from the entity-relationship model.

## **THE ENTITY-RELATIONSHIP MODEL**

### **Multilevel Views of Data**

Firstly, we can identify four levels of views of data.



Secondly, we can show some information Concerning Entities and Relationships (Level 1)

information Concerning Entities and Relationships 		
	definition	example
Entity	An entity is a "thing" which can be distinctly identified.	A specific person, company, or event
Relationship	A relationship is an association among entities	'father-son' is a relationship between two person' entities.'
Entity set	it is a set in which entity has the properties common to the other entities.	EMPLOYEE, PROJECT, and DEPARTMENT.
Relationship set	A relationship set, $R_i$ , is a mathematical relation among $n$ entities, each taken from an entity set: $\{[e_1, e_2, \dots, e_n]   e_1 \in E_1, e_2 \in E_2, \dots, e_n \in E_n\}$	get married
Relationship	each tuple of entities mentioned above, $[e_1, e_2, \dots, e_n]$ is a relationship	a "marriage" is a relationship between two entities in the entity set PERSON
Value	The information about an entity or a relationship is obtained by observation or measurement, and is expressed by a set of attribute-value pairs.	"3", "red", "Peter", and "Johnson"
Value set	Values are classified into different value sets	FEET, COLOR, FIRST-NAME, and LAST-NAME.
Attribute	An attribute can be formally defined as a function which maps from an entity set or a relationship set into a value set or a Cartesian product of value sets: $\{f: E_{(i)} \text{ or } R_{(i)} \rightarrow V_{(i)} \text{ or } V_{(i1)} \times V_{(i2)} \times \dots \times V_{(i1)}\}$	the attribute NAME maps into value sets FIRST-NAME, and LAST-NAME.

We have to know that more than one attribute may map from the same entity set into the same value set. Therefore, attribute and value set are different concepts although they may have the same name in some case. The concept of attribute of

relationship is important in understanding the semantics of data and in determining the functional dependencies among data.

At this time we may wonder to know how to organize the information associated with entities and relationships. The method proposed in this paper is to separate the information about entities from the information about relationships. We shall see that this separation is useful in identifying functional dependencies among data.

The table form is used for easily relating to the relational model. Each row of values is related to the same entity, and each column is related to a value set which, in turn, is related to an attribute. The ordering of rows and columns is insignificant.

Thirdly, we introduce some information structure (Level 1)

The entities, relationships, and values at level 1 are conceptual objects in our minds (i.e. we were in the conceptual realm ) At level 2, we consider representations of conceptual objects.

An entity key is a group of attributes such that the mapping from the entity set to the corresponding group of value sets is one-to-one. It is possible that more than one attribute is needed to identify the entities in an entity set. If we cannot find such available data, we may define an artificial attribute. We usually choose a semantically meaningful key as the entity primary key (PK) .

Since a relationship is identified by the involved entities, the primary key of a relationship can be represented by the primary keys of the involved entities.

In certain cases, the entities in an entity set cannot be uniquely identified by the values of their own attributes; thus we must use a relationship(s) to identify them.

This method of identification of entities by relationships with other entities can be applied recursively until the entities which can be identified by their own attribute values are reached.

### **The derivation to the entity-relationship model:**

#### **The Relational model and E-R model**

Using relational operators in the relational model may cause semantic ambiguities since the same domain name may have different semantics in different relations. In the entity-relationship model, the semantics of data are much more apparent.

the separation of entity relation from relationship relation clarifies the semantics of functional dependencies among data.

#### **3NF Relations Versus Entity-Relationship Relations.**

The entity and relationship relations in the entity-relationship model are similar to 3NF relations but with clearer semantics and without using the transformation operation.

## The Network model and E-R model

The data-structure diagram which I have to say that data-structure diagram is very similar to E-R diagram is a representation of the organization of records and is not an exact representation of entities and relationships.

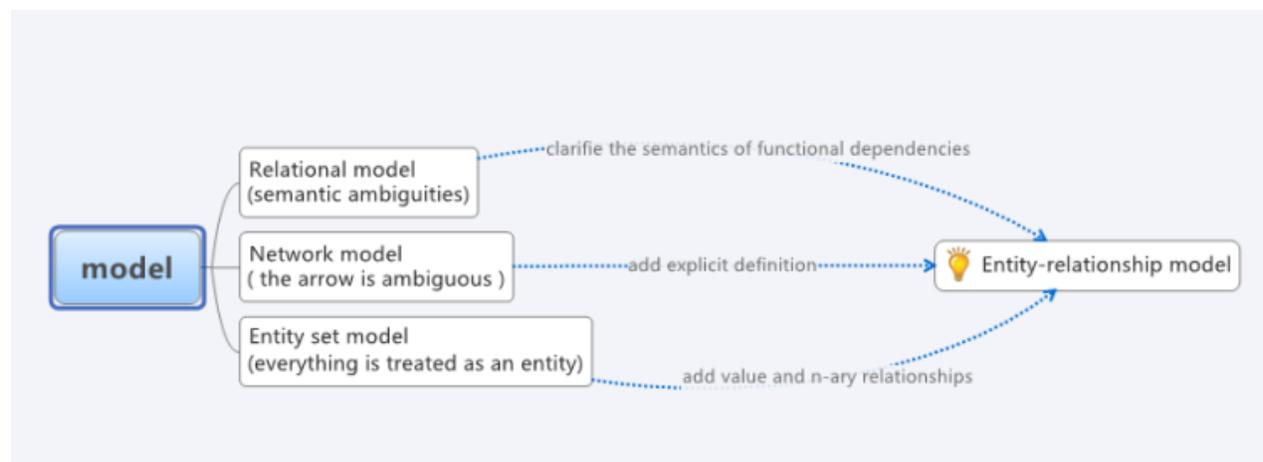
E-R model improved this by giving an explicit definition under what condition an arrow in a data-structure diagram correspond to a relationship of entities.

## The Entity set model and E-R model

(1) In the entity set model, everything is treated as an entity. But in the entity-relationship model, “blue” and “36” are usually treated as values.

(2) Only binary relationships are used in the entity set model, while n-ary relationships may be used in the entity-relationship model.

The derivation to the entity-relationship model



**Conclusion:**

Entity-relationship model is proposed by Peter PS. Chen in 1976, 6 years after E.F. COOD' article. He came up with this model using the entity and relationship just like in the real word to describe the abstract data in the database structure. It is widely used as a tool for database design nowadays. Seeing the problem in proposed model, giving solution to each problem and combining the advantages of the three models, Dr.Chen proposed a new wonderful model and made a big step forward in database develop history.

Source: <http://toyhouse.cc/profiles/blogs/a-review-of-the-entity-relationship-model>