Chapter 21

Relationships Between Relationships: An Empirical Study

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Since Chen published the E/R model in 1976, some proposals extending its expressive power have appeared, some of them are based in the preceding semantic models. Thus, currently, some conceptual models allow relationships between relationships and even generalizations of relationships. These proposals could be better understood if relationships are considered as object types allowing other possibilities as, for example, aggregation of relationships. In this chapter, using a modeling example, we will discuss about the benefits of this approach, mainly about the possibility to model simpler conceptual schemata. We also present an empirical study for proving if modeling with relationships between relationships is more difficult than not use them for novice designers. As a result of this study, it seems that complexity is not affected by the kind of modeling selected.

INTRODUCTION

An essential objective in the modeling task is reducing the gap between a specific universe of discourse and its conceptual representation. As Jesse et al. (1996) state: “...the level of abstraction that we can speak directly affects the...”
size of the problem we can solve.” In order to enrich the representational power of the conceptual models, database community has been extending the E/R model proposed by Chen (1976). Different extensions as Batini et al. (1992), Elmasri and Navathe (1994), Atzeni et al. (1999), improve the E/R models adding concepts as generalisation. Other extensions are based on object-oriented concepts (Rumbaugh et al., 1991) including, for example, the aggregation concept. In this paper we argue about some extension of the relationship concept.

E/R model supports relationship between entities with attributes. Different relationship improvements have been offered, for example MERISE (Morejon, 1994) allows modeling using relationship between relationships and generalizations of relationship. UML (Booch et al., 1997) supports a special kind of class, the “association class.” This class, attached to an association, allows supporting the concept of relationship between relationship directly supported by other models as MERISE.

The concept of relationship between relationship is not a new concept, it was backed up by some semantic models as KL-ONE (Brachman and Schmolze, 1985). In our opinion, it is a pity that this capacity is not generally supported by commercial CASE tools. Recently, some conceptual models (Pirotte et al., 1994; Boch and Odell, 1997) and implementation models (Díaz and Paton, 1994) consider relationship as object types. If relationships are objects they can have attributes, methods (in object-oriented models), relationship with other relationships, generalizations and, as well as aggregations.

In addition to claiming for models that support the capacity before mentioned, the main goal of this paper is to argue about the benefits of considering relationships as object types in the conceptual modeling. Firstly, we’re going to model an example, using this capacity and discussing the benefits of this solution with regard to other approaches. Afterwards, we are going to pose the results of an experiment with a group of students which tries to demonstrate that this new constructor does not imply a more complex way of modeling.

The rest of this chapter is organized as follows: in the next section, through a modeling example, we state the benefits of considering relationships as object types; the third section is the experiment; finally, in the fourth section, we sum up the main conclusions.

RELATIONSHIPS BETWEEN RELATIONSHIPS

In this section we discuss the advantages of considering relationships as object types in conceptual modelling. A conceptual schema for the library of a university is used as an example. Figure 1 sums up the library requirements. For the discussion we are going to use MIMO (Marcos, 1997), a model which improves
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