



Chapter XI

Inclusion Dependencies

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ABSTRACT

The evaluation of conceptual schemes of actual databases may result in the discovery of inclusion dependencies. An inclusion dependency is defined as the existence of attributes in a table whose values must be a subset of the values of attributes in another table. When the latter set conforms a key for its table, the inclusion dependency is key-based. Key-based inclusion dependencies are fully enforced by most current database systems. On the contrary, if the second set is not the key of the relation, the inclusion dependency is non-key-based. This kind of inclusion dependency is completely disregarded by actual systems, obliging the users to manage them via special-case code or triggers. This implies an excessive effort to maintain integrity and develop applications, among other inconveniences. The chapter goal is to give a heuristics to redesign the conceptual schema. This is based on the identification of hidden business rules and the conversion of non-key inclusion dependencies into key-based ones.

INTRODUCTION

Software engineers seldom have to deal with perfectly conceived software artifacts or with organizational contexts in higher levels of the Capability Maturity Model (Paulk, et. al.). They should be able to deal with poorly controlled processes, facing the challenge of improving them towards well-defined developed environments. The reengineering of available software systems is absolutely necessary in these situations. Software tools, guides, heuristics, etc. could make an important difference in the process of quality improvement. This chapter focuses on these problems in relational database applications.

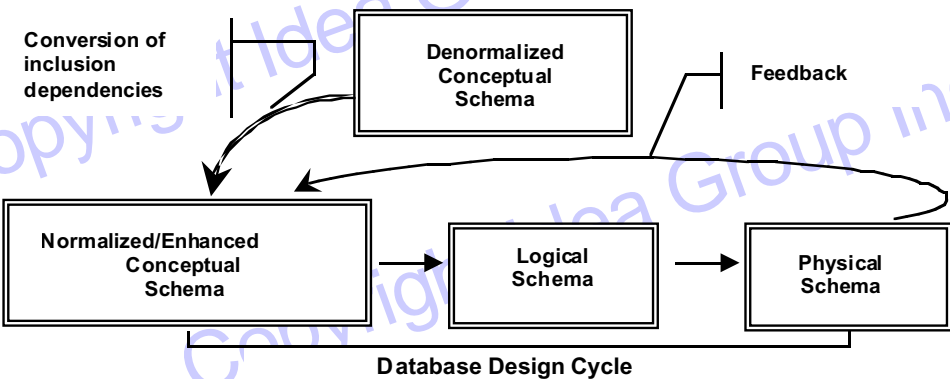
Frequently the conceptual schema of a relational database becomes obscure and hard to read, since many users do not carefully follow well-defined design methods. This happens no matter how many books, papers and manuals recommend this practice.

In the real-world there are inexperienced and poorly trained database designers building low quality conceptual schemas. However, good training and experience do not ensure a good design. Several other conditions are needed, mainly related to the organizational context.

Malpractices usually lead to a semantically poor database schema restraining the effective utilization of data by the enterprise. Moreover, objects omitted or removed from the physical schema obscure interobject dependencies. However, the schema can be restored since it is always possible to move back to a well-supported process (Figure 1). This chapter is devoted to give support to the reengineering of the actual system.

Conceptual schemas of actual databases holding these design flaws usually contain inclusion dependencies. As can be read in Codd (1990, p. 26), "...Referential integrity is a particular application of an inclusion dependency. Such a constraint requires that the set of distinct values occurring in some specified column, simple or composite, must be a subset of the values occurring in some other specified column (simple or composite, respectively). In the case of referential integrity restrictions (key-based inclusion dependencies), the set of distinct simple foreign key values

Figure 1. The reengineering process



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