Roles in ORM: A Suggested Semantics

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Abstract. Evidence grows that ORM has some problems to overcome in order to escape the charge that it cannot reliably lead, as claimed, to ONF (optimal normal form) relational schemas. Some of that evidence we present here. We also indicate that there is more than one way to address the issue effectively, thus saving ORM's reputation as a generator of fully normalized relational schemas. But of two ways mentioned, the more satisfactory one involves, essentially, ascribing a certain semantics to the idea of "role-playing" in ORM. We show how it would address these issues, and why it is the better approach.

1 Introduction

As an information-system design method, ORM has long been touted as able to produce, reliably and by application of an algorithm, Fifth Normal Form (5NF) relational database schemas, free of redundancy. (Indeed, it produces Optimal Normal Form (ONF) schemas, which implies also a minimum number of mapped relational table schemes.) This is certainly an important claim for ORM's marketing message. However, increasingly it appears doubtful that this claim is entirely accurate. The need for "pre-Rmapping" transformations, or for "fixes" to Rmap, in order to rid the mapped relational schema of redundancy, has increasingly loomed. Indeed, as we will show early in this paper, although the problems in this regard have become familiar somewhat, they are broader than has been made clear from the well-known examples.

That is not to suggest that such problems are hard to "fix". But the usual approach to "fixing" these problems, which is to add some transforms or manipulations to the Rmap algorithm so as to produce a clean, 5NF schema, leave open the question of whether ORM is faultless in the matter: Do not these "fixes", it may be asked, simply patch the conceptual ORM schema? If so, what becomes of that claim for ORM?

Moreover, there is another approach to addressing these problems that we will argue is, for this and other reasons, more satisfactory. Nor does it do away with any convenient ORM constructs or transformations. That approach is to give "role-playing" in ORM a particular, definite meaning which we shall specify in this paper.

The plan of the paper is as follows. In section 2 we indicate the seeming lack of, but need for, specifics on what we mean in ORM by designating a particular object a "role-player" in a given fact. In section 3 we point out that the well-known difficulty of Rmapping nested entity types lacking fully-spanning uniqueness constraints (UCs) is just a special case of a more general problem that transcends nesting altogether and which demands that which we call "reference-scheme reduction" transforms, pre-Rmap—or equivalent "fixes" to Rmap. It would be incorrect, therefore, to suppose we

R. Meersman, T. Dillon, and P. Herrero (Eds.): OTM 2011 Workshops, LNCS 7046, pp. 360–369, 2011.