

11ed Chapter 3

The Relational Database Model

Discussion Focus

Why is most of this book based on the relational database model? The answer to that question is, quite simply, that the relational database model has a very successful track record and it is the dominant database model in the market.

But why has the relational database model (RDM) been so successful? The Object Oriented database model (OODM) seemed to be poised to dislodge the RDM in the face of increasingly complex data that included video and audio ... yet the OODM fell short in the database arena. However, the OODM's basic concepts have become the basis of a wide variety of database systems analysis and design procedures. In addition, the basic OO approach has been adopted by many application generators and other development tools.

The OODM's inability to replace the RDM is due to several factors. First, the large installed base of RDM-based databases is difficult to overcome. Change is often difficult and expensive, so the prime requisite for change is an overwhelming advantage of the change agent. The OODM advantages were simply not accepted as *overwhelming* and were, therefore, not accepted as cost-effective. Second, compared to the RDM, the OODM's design, implementation, and management learning curves are much steeper than the RDM's. Third, the RDM preempted the OODM in some important respects by adopting many of the OODM's best features, thus becoming the extended relational data model (ERDM). Because the ERDM retains the basic modeling simplicity of the RDM while being able to handle the complex data environment that was supposed to be the OODM's forte, you can have the proverbial cake and eat it, too.

The OODM-ERDM battle for dominance in the database marketplace seems remarkably similar to the one waged by the hierarchical and network models against the relational model almost three decades ago. The OODM and ERDM are similar in the sense that each attempts to address the demand for more semantic information to be incorporated into the model. However, the OODM and the ERDM differ substantially both in underlying philosophy and in the nature of the problem to be addressed. Although the ERDM includes a strong semantic component, it is primarily based on the relational data model's concepts. In contrast, the OODM is wholly based on the OO and semantic data model concepts. The ERDM is primarily geared to business applications, while the OODM tends to focus on very specialized engineering and scientific applications. In the database arena, the most likely scenario appears to be an ever-increasing merging of OO and relational data model concepts and procedures.

Although the ERDM label has frequently been used in the database literature to describe the -- quite successful -- relational data model's response to the OODM challenge, C. J. Date objects to the ERDM label for the following reasons (set forth in "Back to the Relational Future" www.dbpd.com/vault/9808date.html):

- The useful contribution of the object model is its ability to let users define their own -- and often very complex -- data types. However, mathematical structures known as "domains" in the relational model

also provide this ability. Therefore, a relational DBMS that properly supports such domains greatly diminishes the reason for using the object model. Given proper support for domains, relational data models are quite capable of handling the complex data encountered in time series, engineering design, office automation, financial modeling, and so on. Because the relational model can support complex data types, the notion of an “extended relational data model” or ERDM is “extremely inappropriate and inaccurate” and “it should be firmly resisted.” (The capability that is supposedly being extended is already there!)

- Even the label object/relational data model (O/RDM) is not quite accurate, because the relational data model’s domain is not an object model structure. However, there are already quite a few O/R products -- also known as **universal database servers** -- on the market. Therefore, Date concedes that we are probably stuck with the O/R label. In fact, Date believes that “an O/R system is in everyone’s future.” More precisely, Date argues that a true O/R system would be “nothing more nor less than a true relational system -- which is to say, a system that supports the relational model, with all that such support entails.”

C. J. Date concludes his discussion by observing that “We need do nothing to the relational model to achieve object functionality. (Nothing, that is, except implement it, something that doesn’t yet seem to have been tried in the commercial world.)”

Because C. J. Date is generally considered to be one of the world’s leading database thinkers and innovators, his observations cannot be easily dismissed. In any case, regardless of the label that is used to tag the relational data model’s growing capabilities, it seems clear that the relational data model is likely to maintain its database market dominance for some time. We believe, therefore, that our continued emphasis on the relational data model is appropriate.