Chapter III

Design and Analysis of Active Hypertext Views on Databases

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ABSTRACT

The design and maintenance of data-intensive Web sites is a demanding task. The effort can be significantly lowered by using two verified technologies: databases and hypertexts. The first is well suited to administrate a large amount of data; the second has proven to be an easy to use and efficient means of accessing information. The task can be made even easier by using a declarative approach, i.e., the data structure and hypertext structure are both explicitly defined, and the specification is expressed in terms of structure transformation. In addition to the specification language, we provide a design technique: starting with the
database structure, the designer applies refinement heuristics that eventually yield an efficient hypertext structure for the final user. The hypertext thus obtained can be seen as a view on the database. A fully functional hypertextual interface should also enable the user to perform update operations on the database. Our system provides this facility, including mechanisms to tackle the well-known update-through-views problem by providing specific mechanisms. Finally, the nonprocedural approach has a supplementary advantage: it offers the possibility of analyzing the hypertext structure before setting it in production, in particular, analyzing the reachability of information or determining the length of the navigation path.

INTRODUCTION: HYPERTEXT VIEWS AND DATABASE PUBLISHING

The simplicity and ease of use of the hypertext paradigm are probably among the most important factors that lead to the rapid success of the World Wide Web. In particular, the concept of hypertextual navigation has proven highly efficient for easily accessing information without prior knowledge of its structure and organization. Contrary to what happens with databases, the hypertext user does not need to learn a sophisticated query language, like SQL, to retrieve information. Nevertheless, storing, retrieving, and processing large amounts of data in an efficient and secure way requires the use of database technology. This is why most organizations store their information in databases, which are at the heart of their information systems.

The idea of using the hypertext paradigm of the Web as a universal database interface emerged during the early days of the Web. It seems that the ability to access a database from any personal workstation, through a Web browser, without installing any specific client application, was another success factor of the Web. Recent studies (Lawrence & Giles, 1998) claim that 80% of the information available on the Web is actually stored in databases and generated on the fly. This shows that database publishing on the Web is an important activity in the general field of Web engineering.

In this perspective, we can define the notion of hypertext view of a database as a set of hypertext nodes and links that

- Present the contents of the database to the hypertext user
- Replace database querying by hypertext navigation
- Enable the authorized user to act on the database in order to update its content
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