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Integrating XML and Relational Data

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Abstract

For the past few decades, there has been a significant interest in data integration, and lots of work has been introduced in this field. Herein we discussed a way to handle the problem of integrating heterogeneous data model, namely relational and XML. Since the relational model is the most data model used to manage data for years. Similarly, XML is rapidly becoming more and more popular as a standard format for exchanging information. In such way, building a sort of connection bridging these two models is clearly a need. To this point, we aim to define a system to extract data regardless of the nature of their model and make one query enough to retrieve data from different models, which are XML and relational in our case. Accordingly, users do not have to be familiar with multiple query language syntax at a time, they can extract data represented in both models by any query language, even if it is not the correspondent query language of the model in question.

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Keywords: XML; XPath; SQL; Relational Model; Model Integration

1. Introduction

This paper addresses the problem of accessing data represented in different data models by using a unique query language. Since users may not be familiar with multiple query language syntax at a time, we need to facilitate accessing data by making one single query in any query language enough to retrieve data on any data model. As a start, the models under study are the relational and XML (eXtensible Markup Language), and we aim to integrate others especially the most used and famous ones. Why exactly these two models? In one hand, relational databases

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are still very essential and critical infrastructure in most organizations and have utility widely used to manage and maintain a large volume of data. On the other hand, XML has received considerable attention due to its multiple benefits, especially as it is auto-descriptive, extensible and usable in all fields of applications. Last, they are complementary in practice.

There have been many attempts to query XML and relational data. Moreover, with XML becomes the lingua franca of data interchange increasingly, many research has been done to query XML Database using relational database system^{1,2}. Furthermore, others have been focused on designing general systems to manage XML among other data formats³. Such approaches have great opportunities as it has some limitations as well⁴. Our purpose, therefore, is to define a system for querying data stored in different models, such as the relational and XML with any query language of these models. That means that users do not need to know each query language of each data model, one query language is enough and will meet the purpose, even if the language is none of the corresponding ones of the model in question. Hence, our proposal system will be independent of the data model and the query language as well.

The remainder of this work is organized as follows. Section 2 introduces some terms related to our zone. Section 3 describes some related work and compares our approach to them. Section 4 explains the main idea of our approach. Finally, Section 5 summarizes our contribution.

2. Terminology

2.1. XMLType

Since Release 1 version 9i, the XMLType data type was introduced to facilitate the native management of XML documents by providing different storage and indexing models to best fit the kind of XML data and the pattern of its use⁵. The data type XMLType provides a number of the features, most relating to XML (validation of XML schema and XSL transformation), other which relate to Structured Query Language (SQL), like: definition of a column of a table (playing the role of a type of data), definition of a table (playing the role of an object type), declaration of variables in PL/SQL, and, call for stored PL/SQL Procedures.

2.2. SQL/XML

Since SQL is the standard language for the access and the management of data stored in relational Database Management System (RDBMS), it is natural that businesses and consumers around the world want to have the opportunity to integrate their XML data into relational data, through the language of SQL. In the second half of 2000, the SQL/XML project⁶ was approved, it is a new part of SQL, which is XML-Related specifications, it was then only the infrastructure⁷. After that, SQL/XML have known a few small corrections adding new features^{8,9} and making good progress. Besides, different software providers have made their implementations standard including IBM Corporation and Oracle Corporation.

SQL/XML Introduced XML data types and added a number of functions to SQL in such a way that it is possible to build XML elements and attributes from relational. This language includes data type XMLType, functions of XPath extraction, and, integration of XQuery features to SQL.

2.3. XML DB

In Oracle Database 12c, the module XML DB^{10,11,12} provides new features so users can get all the benefits of relational database technology plus all the advantages of the W3C's XML standards. This technology expands the capabilities of the relational database by providing full support for all of the key XML standards. The module XML DB offers an independent structure for the storage and management of XML data. Regardless of the storage mode, the functions of extraction of the XML DB produce the same results. It offers the following features: an XML data type which is used to store and manage XML content; a collection of methods and SQL operators to act on the XML; and, the possibility to save a schema consistent with the W3C in the Oracle database.

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