Chapter V

The Development of Ordered SQL Packages in Peer-to-Peer Data Warehousing Environments

Wilfred Ng
The Hong Kong University of Science and Technology, Hong Kong

Mark Levene
University of London, England

ABSTRACT

This chapter discusses how the capabilities of database languages are enhanced to manipulate user-defined data orderings within the framework of the Ordered Relational Model (the ORM), which incorporates partial orderings into data domains. The motivation for applying the ORM in data warehousing environment is that business queries in an enterprise usually involve order. We have already defined and implemented Ordered SQL (OSQL), which allows users to capture the underlying semantics of the ordering of the data for a given application. Herein we demonstrate that OSQL aided with a package discipline can be an effective means to manage the inter-related operations and the underlying data domains of a wide range of advanced applications that are vital in data warehousing, such as temporal, incomplete, and fuzzy information. We also discuss the employment of OSQL system with...
three packages of OSQL_TIME, OSQL_INCOMP, and OSQL_FUZZY over a Peer-to-Peer network. Using our suggested framework, the data content of a data warehouse can be better adapted in a dynamic environment.

INTRODUCTION

In a traditional sense, data warehousing is a corporate strategy that needs to integrate information from several sources of separately developed Database Management Systems (DBMSs), which usually consist of limited kinds of information (e.g., sales and customer data) and support a stable group of users (e.g., a few decision makers in an organization). As the Internet and WWW have been commonly used in recent years, the underlying DBMSs of a data warehouse needs to provide adequate facilities to manage a wide range of information arising from integrating heterogeneous data sources. Moreover, advanced data warehouses need to support queries arising from those users in a mobile environment.

In this chapter we discuss how the capabilities of database languages are enhanced to manipulate user-defined data orderings within the framework of the Ordered Relational Model (or simply the ORM), which incorporates partial orderings into data domains (Ng, 2002b). The motivation for applying the ORM in data warehousing environment is that business queries in an enterprise usually involve order. Our previous work already defined and implemented a minimal extension of SQL, called Ordered SQL (OSQL), which allows querying over ordered relational databases (Ng & Levene, 2001). One of the important facilities provided by OSQL is that it allows users to capture the underlying semantics of the ordering of the data for a given application. Herein we demonstrate that OSQL, aided with a package discipline, can be an effective means to manage the inter-related operations and the underlying data domains of a wide range of advanced applications that are vital in data warehousing, such as temporal, incomplete, and fuzzy information.

We also discuss the employment of OSQL system with three packages of OSQL_TIME, OSQL_INCOMP, and OSQL_FUZZY over a Peer-to-Peer (or usually written as P2P) network. The application of the networked data warehouse can be visualized in the following scenario: many end-user PCs share the data warehouse resources and request a variety of information to support decisions, but at the same time individuals are able to share their resources. In other words, each peer member is able to enter the network to access a warehouse, share its content, and store the results in a dynamic way. For example, in the financial sector, professional stock traders need to obtain information from a stock data warehouse and share such information in order to make investment decisions in global market.
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