A Conceptual Modeling Personalization Framework for OLAP

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ABSTRACT

OLAP (On-line Analytical Processing) technologies rely on multidimensional models to provide decision makers with appropriate structures allowing them to intuitively analyze data. However, these multidimensional models may be potentially large, thus becoming too complex to be understood at a glance. Current approaches for OLAP design are focused on providing analysts with a single multidimensional schema derived from their previously stated information requirements, but this is not sufficient to lighten the complexity of the decision making process. To overcome this drawback, the authors propose personalizing multidimensional models for OLAP technologies according to the continuously changing user characteristics, context, requirements and behavior. In this paper, they present a new approach for personalizing OLAP systems at the conceptual level based on the underlying multidimensional model, a user model and a set of personalization rules. Transformations are defined by means of a model-driven strategy to assist in the process of obtaining the corresponding personalized OLAP schemas from these models.

Keywords: Conceptual modeling, Model-Driven Strategy, Multidimensional Modeling, On-line Analytical Processing (OLAP), Personalization

INTRODUCTION

Current approaches for OLAP start by defining a multidimensional model (Rizzi, Abelló, Lechtenbörger, & Trujillo, 2006) in order to obtain a unified view with which all decision makers intuitively fulfill their information needs. However, this single multidimensional schema may be quite large and complex as it may deliver information to many kinds of decision makers who may have different needs (Stefanidis, Pitoura, & Vassiliadis, 2006), as we
can see below in the motivation example. The main disadvantage is that decision makers are forced to understand and navigate the whole complex schema if they want to be able to find and acquire suitable data. To overcome these drawbacks, we propose a multidimensional schema that provides a personalized OLAP view for each individual user.

Figure 1 shows an overview of our approach for OLAP personalization: analysts interact by means of OLAP clients with an OLAP server. The proposed solution also includes a personalization engine which interacts with the OLAP client to provide the analyst with the personalized metadata and the OLAP server to manage the OLAP metadata. When defining automated personalization, the designer has to specify a set of rules that fulfill the system personalization requirements. It might happen that the personalization rules defined do not exactly fulfill the requirements, however since these rules are independent of the rest of the conceptual models and the implementation of the OLAP cube, they can be refined at execution time. The engine interacts with the analyst by means of the OLAP client providing her/him a personalized view of the data. It might happen that the final user wants to check all the data, with any filtering, which is always available.

The personalization actions are only performed once during a session not to overwhelm the user with constant updates. This means that the adaptive information will be the same during the present session. This is the default option, but it is also possible that the designer decides when an adaptation should take place to fulfill each personalization requirement. Our approach can be described into two stages, first, we propose how to modeling the personalization in OLAP, and, in the second stage, we perform the generation of personalized OLAP metadata by applying a set of transformations within a model-driven strategy. Each of these stages is described in their corresponding section.

Due to the overwhelming volume of information that OLAP schemas contain, personalization is a key factor for improving the satisfaction of the decision maker (Stefanidis, Pitoura, & Vassiliadis, 2006). Several OLAP approaches provide decision makers with personalized views which focus on different aspects (see Related Work section for details). However, none of them permits the personalization of schemas at the conceptual level. This may cause several problems such as difficult maintenance, no independence of the target platform, evolution of the information requirements, etc. Furthermore, none of these approaches allow...
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