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Mechanisms of Data Integration in Information Systems

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Abstract. The effectiveness of enterprise management is providing by common use of information systems, which can only increase through flexible data management. The creating mechanisms for data integration are one of the most pressing issues in the field of information system. The nature and complexity of integrating methods are greatly depends on the level of integration, the features of various data sources and their set as a whole, and the identified ways of integration.

Keywords. Information System, Integration, Architecture, Wrappers, Mediators, Data Model.

INTRODUCTION

The data integration in information systems is understood as providing a united unified interface to getting access to the some integrity of nonuniform independent data sources. The problem of data integration is quite multifaceted and diverse [1]. The complexity and nature of the methods, which are used to solve it, depend on the level of integration, data source properties and methods of integration.

Data sources are the one of the problem areas, they have different properties, support the presentation of data in different data models, can be static or dynamic, etc. Difference between data sources appears in the data integration systems in various aspects of the physical, logical and semantic levels [2].

During the creation of a system's integration should be identified a number of major objectives:

1) The development of the architecture of data integration system;

2) The development of global data model;

3) The integration of metadata;

4) The development of mechanisms of data semantic integration;

5) The development of mechanisms of data presentation.

THE ARCHITECTURE OF SYSTEMS OF INTEGRATION

In systems of data integration to solve the derived problems, is necessary to use data converters that provide integration data model (DM) and mechanisms for DM representation. The use of object adapters (Wrappers) and «intermediaries» (Mediators) [3] allows to develop methods, architecture of which provides interaction between data processing facilities that are used in various information systems. The intermediary has task of supporting a single user interface based on a global representation of data that contained in the sources, as well as support for the mapping between global and local data representations. The user request, that is formulated in terms of a single interface, is decomposed into a plurality of sub-queries are addressed to the necessary local data sources. Based on the results of their processing is synthesized a complete response to the request.

The use of two kinds of architecture with intermediary - Global as View and Local as View allows cover the entire life cycle of information exchange. The first of these (Global as View) provides a definition for the global integrated data in a way that are defined by templates for local sources. This approach allows work more effectively with a variety of used sources. If the system of integration is used to support the full materialized view of integrable data, data conversion processes from sources to a single global view are making at the same time.

When using a second kinds of of architecture (Local as View) it is assumed that representation

for each of the local data sources is specified in terms of a given integrating global representation. Although in this case becomes more complicated mapping user queries to local data sources environment, this approach allows the presence of the dynamic set of data sources. It also allows using a new source at the development stage, and at the operation phase.

ELEMENTS OF INTEGRATION SYSTEM

As global data models to support a single user interface in the systems of integration ordinary widely used data models are used more often, for instance, relational or object model. In connection with the expansion of the web application development as the integrating data model, model based on XML standards has been widely used. When using the heterogeneous data models in different data sources, very often to provide the support of the global data representation is created a special integrating data model (IDM). That can provide a representation of both structured and semi structured data [4]. During IDM development is used an approach, that is based on supporting different data sources. Such integrating both models provide a solution to the dual problem - support for a variety of different representations of the same data.

The semantic integration of data is based on the use of semantic intermediaries - Mediators. They are mechanisms, which are based on the ontological source specification. For Mediators is need to use integrated ontologies of data sources. They are paired with IDM integrates semantic data. To solve the problem of semantic data integration from multiple sources is need to use the device descriptive logics. Its implementation is easy to do with the description language of ontologies OWL. In this domain ontology is used as a conceptual scheme. The advantage of this approach is that the basis of the user interface in this case is a high-level semantic data model.

An inalienable element of the functional architecture of data integration system is a mechanism for displaying data models. The concept of the gateway is using in systems that enable the integration of external data sources in the environment of database systems. It is seemed like a mechanism for source data representation into the database system environment. The standardization of such SQL databases presentation is provided by using specifications SQL / MED. During data integration based on CORBA platform is used object adapters - Wrappers. The ability to support the IDL-interface of encapsulated information resources allows to "encapsulate" non-object resources, for instance, legacy systems databases. It allows to create and use the object integrated environment of heterogeneous information resources in a future.

CONCLUSIONS

In this paper were conducted studies in the direction of improving the mechanisms development of data exchange between information systems. This issue is important because it provides the full-fledged integration of information systems, which allows to manipulate the data flexible. To ensure the full life cycle is proposed to use two kinds of architecture with a mediator - Global as View and Local as View. The use of a mediator, in turn, supports a single user interface using the global data reporting.

REFERENCES

[1] Shendryk V. V., Boiko A. O., Bondar O. V. The analysis of approaches for the functional modeling of information systems //Technology audit and production reserves. – 2015. – T. 4. – №. 2 (24). – C. 19-24.

[2] Vira Shendryk , Andrii Boiko. Stages of the information systems development in the process approach // Procedia Computer Science. – 2015. – V. 77. – P.98-103.

[3] Manolescu I., Florescu D., Kossman D. Answering XML Queries over Heterogeneous Data Sources. Proc. Of the 27th VLDB Conference, Roma, Italy, 2001.

[4] Kulvatunyou, B., Wysk, R. A. A functional approach to enterprise-based engineering activities. Journal of Manufacturing Systems, Vol. 19, No. 2, 2000, pp. 156 – 171.

[5] O'Brien, W. J, Joachim, H., Siddiqui, M., Topsakal O. Challenges, approaches and architecture for distributed process integration in heterogeneous environments. Advanced Engineering Informatics, Vol. 22, No. 1, 2008, pp. 28 – 44.