

Chapter 4.5

Web Services as XML Data Sources in Enterprise Information Integration

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ABSTRACT

More and more systems provide data through web service interfaces and these data have to be integrated with the legacy relational databases of the enterprise. The integration is usually done with enterprise information integration systems which provide a uniform query language to all information sources, therefore the XML data sources of Web services having a procedural access interface have to be matched with relational data sources having a database interface. In this chapter the authors provide a solution to this problem by describing the Web service wrapper component of the SINTAGMA Enterprise Information Integration system. They demonstrate Web services as XML

data sources in enterprise information integration by showing how the web service wrapper component integrates XML data of Web services in the application domain of digital libraries.

INTRODUCTION

Traditional Enterprise Information Integration focuses mainly on the integration of different relational data sources, however recent enterprise information systems follow the service oriented architecture pattern and are based on web services technology¹. In addition, more and more information and service providers on the internet provide web service interface to their system. The integration of these new information sources requires that the Enterprise Information Integration system has an interface towards web services.

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This chapter describes a solution to this problem using the SINTAGMA Enterprise Information Integration System² and extending this system with a *Web Service Wrapper* component (which is the main contribution of this chapter). SINTAGMA is a data centric, monolithic information integration system supporting semi-automatic integration of relational sources using tools and methods based on logic and logic programming (see Benkő et al. 2003) based on the SILK tool-set which is the result of the SILK (System Integration via Logic & Knowledge) EU project.

In order to prepare for the challenge of integrating XML data provided by web services, we extended the original SINTAGMA system in two directions. First, the architecture of the SINTAGMA system was changed significantly to be made up of loosely coupled components rather than a monolithic structure. Second, the functionality has become richer as, among others, the system now deals with Web Services as information sources. The component responsible for this is the Web Service Wrapper which is the main contribution of this chapter.

Mixing relational data sources and web services during an information integration scenario can be very useful as demonstrated by a use case by Lukácsy et al. 2007 and poses the challenge of representing procedural information as relational data.

This chapter is structured as follows. First we put the problem in the context of related work, then we describe the main ideas behind the SINTAGMA system in a nutshell, then we provide an overview of the basic web service concepts and the modelling language of SINTAGMA, then we present how we model and query web services, with samples. Finally, we demonstrate web service integration in a digital library application and summarize our application experiences and conclusions.

RELATED WORK

There are several completed and ongoing research projects in using logic-based approaches for Enterprise Application Integration (EAI) and Enterprise Information Integration (EII) as well.

The generic EAI research stresses the importance of the Service Oriented Architecture, and the provision of new capabilities within the framework of Semantic Web Services. Examples for such research projects include DIP (see Vasiliu et al. 2004) and INFRAWES (see Grigorova 2006). We have also approached the EAI issue from the agent technology point of view (see Varga et al. 2005 and Varga et al. 2004). These attempts aim at the semantic integration of Web Services, in most cases using Description Logic based ontologies, agent and Semantic Web technologies. The goal of these projects is to support the whole range of EAI capabilities like service discovery, security and high reliability.

Most of the logic-based EII tools use description logics and take a similar approach as we did in SINTAGMA, that is, they create a description logic model as a view over the information sources to be integrated. The basic framework of this solution is described e.g. by Calvanese et al. 1998. The disadvantage is that these types of applications deal with relational sources only and are therefore not applicable to process modeling.

This chapter unifies the procedural EAI approach and the relational EII approach by integrating relational and functional XML information sources within the SINTAGMA system. The advantage of this approach is that the integration team does not have to implement web service interface to relational databases nor relational database interface to web services, because the SINTAGMA system automatically integrates the different sources. In addition to the integration, the SINTAGMA system includes several optimizations when answering queries on the integrated system.

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