Chapter XIII
WebFINDIT:
Providing Data and Service–Centric Access through a Scalable Middleware

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ABSTRACT

The ubiquity of the World Wide Web facilitates the deployment of highly distributed applications. The emergence of Web databases and applications has introduced new challenges related to their orga- nization, access, integration, and interoperability. We present a dynamic architecture and system for describing, locating, and accessing data from Web databases and applications. We describe a scalable middleware for efficient data and application access that we have built using the available technologies. The resulting system is called WebFINDIT. It is a scalable and uniform infrastructure for accessing heterogeneous and autonomous databases and applications.

INTRODUCTION

The information revolution has led organizations worldwide to rely heavily on numerous databases to conduct their daily business. Because databases usually exist in broad, highly dynamic network-based environments, formally controlling the changes occurring in the information space-such as registering new information sources or eliciting cooperative tasks-poses a challenge. Moreover, the World Wide Web has facilitated access to any database (located virtually anywhere) with a Web interface. These Web-accessible databases, or *Web databases*, provide an elegant solution to store any data content to which a ubiquitous access is needed (Gribble, 2003). However, there is a need to provide users with a uniform, integrated view for querying the content of *multiple* Web databases. In this regard, *interoperability* between disparate systems provides the biggest challenge. To address the interoperability issue, more than a networking infrastructure is needed. The need has therefore arisen for a middleware that transcends all types of heterogeneities and provides users with a uniform view of the content of Web databases (Bouguettaya *et al*, 2006).

Key requirements of an integrative middleware for Web databases includes the ability to provide across the board transparency to allow users to access and manipulate data irrespective of platforms, locations, systems, etc (Bouguettaya *et al*, 2004; Su, 2005). Moreover, flexible tools for information space organization, communication facilities, information discovery, content description, and assembly of data from heterogeneous sources is required. To meet these challenges, we identify three key issues:

- *Locating* relevant information sources. In Web applications, the information space is very large and dynamic. A way must be found to organize that information space in a rational and readily comprehensible manner to facilitate the location of pertinent data.

- *Understanding* the meaning, content, terminology, and usage patterns of the available information sources. Users must be educated about the information of interest and dynamically provided with up-to-date knowledge of database contents. Users must also be instructed as to the appropriate means of linking to information sources.
- *Querying* sources for relevant information items. Once appropriate information sources have been found, users need to be provided with the tools necessary to access and integrate data from these information sources.

To address the above mentioned issues, we have developed a middleware framework for supporting seamless access to Web databases and applications. WebFINDIT integrates a large set of heterogeneous technologies. A key feature of the system is the large spectrum of heterogeneities being supported at all levels, including hardware, operating system, database, and communication middleware. We have presented an easy to use architecture for databases to be accessed over the Web, despite their distributed, autonomous and heterogeneous nature. WebFINDIT provides a scalable and distributed ontological approach for organizing Web databases according to their domains of interest. It also provides a uniform interface to query Web databases and applications as if they are components of a single Web accessible database. We have provided an extensible middleware for querying autonomous Web databases and applications. We have incorporated Web services in our system to provide uniform access to applications. The Web services technology has been developed to assist in the integration and interoperation of isolated, autonomous and heterogeneous sources of information and services. The participants of a Web services system do not have to worry about the operating system, development language environment or the component model used to create or access the services.

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