Chapter X

CODAR: A POA-Based CORBA Database Adapter for Web Service Infrastructures

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ABSTRACT

Connecting heterogeneous databases through the World Wide Web (WWW) is crucial for most business organizations. The underlying complex problem is the handling of heterogeneity and communication between different data repositories (or database systems). Such interoperability is crucial as it enables the integration of business processes across different business organizations, and therefore becomes a key issue within the new generation of Web-based business applications (called Web Services).

CORBA (Common Object Request Broker Architecture) provides protocols and components that allow interoperability between different software platforms (Tari & Bukhres, 2001), such as C++ and Java. However, CORBA does not deal with WWW-based interoperability. In this paper we propose an extension of one of the core elements of CORBA, called Portable Object Adapter (POA),
to deal with persistency of business information. The proposed extension, called CODAR, manages the whole life cycle of persistent objects, including activation, deactivation, instantiation, and deletion. At the end of this paper we describe an extension of CODAR to deal with performance by including advanced caching and prefetching techniques.

INTRODUCTION

The WWW (World Wide Web) provides a unique opportunity for enterprises to market their core businesses on the Internet. Databases are probably the most obvious applications where the benefits are straightforward, since customers will be able to use customized Web-based interfaces which are connected to back-end databases to retrieve and update information. This obviously has provided a great deal of flexibility to clients. However, there is more and more need for Web-database interoperability to enable integration of business applications across different enterprises. An airline company (say Qantas, Boeing), which traditionally uses its own databases to record information, can expand its business offerings by providing added-value services which will include booking hotels and car rental (by outsourcing them to specific service providers). Because the service providers for the new services use their own databases, Web-based interoperability is required to provide a complex service across different enterprises. Such value-added services are called Web Services (McIlraith, Son, & Zeng, 2001) and are widely addressed as a part of Internet 2 Specifications.

One of the complex problems related to Web Services is the interoperability between various heterogeneous data repositories supported by different enterprises. Obviously there are also other important aspects, such as service discovery and service composition. In this paper however, our focus will be on the design of a communication infrastructure so Web databases can be transparently used without a need to know and to manage their heterogeneity.

Existing technologies, such as CORBA (Common Object Request Broker) (OMG, 1998a), DCOM (Sessions, 1997) and Jini (Waldo, 1999), enable interoperability across different software and hardware platforms. CORBA, for example, provides basic components to deal with low-level communication, such as Portable Object Adapter (POA) and Object Request Broker (ORB). However, one of the main problems of CORBA is that it does not support data persistency. Such persistency is crucial for most enterprises that aim at storing and managing large heterogeneous data sources (through the World Wide Web). Several ad-hoc solutions have been proposed to deal with persistency by interfacing an ORB with databases using JDBC’s APIs. However, these solutions do not address the real problem of CORBA object persistency, which is how to make dynamically object persistent within databases.

CORBA has been chosen in this project as a core distributed technology because this is based on a widely adopted industrial standard. We therefore believe
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