Database Middleware for Distributed Ontologies in State and Federal Family & Social Services

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1 Introduction

Collecting benefits using current FSSA systems is time-consuming, frustrating, and complex for needy citizens and social workers. This requires citizens to visit several offices in and outside their hometowns to receive benefits they are entitled to. In many cases, dealing with this process prevents underprivileged citizens from devoting adequate time to enhancing their prospects for becoming self-supporting with a consequential harmful impact on their health and safety.

In the WebDG (Web Digital Government) project, we investigate the design and implementation of a middleware for organizing, accessing, and managing government welfare databases. The project employs a variety of strategies to pursue the simple goal of making life easier for citizens and government employees at Indiana FSSA alike. The disadvantaged citizens would have most of their needs satisfied in one single meeting. Social workers would be able to access all necessary information using a one-stop shop: *the Web*. In this paper, we overview the major contributions within our project and the fully operational prototype that has resulted from this project.

2 Contributions

In this project we have addressed several challenging issues to allow a uniform access to E-Government Databases while preserving citizens privacy. This section outlines our different contributions in that respect.

2.1 Database Ontologies

We propose a novel ontological framework for sharing and accessing government databases. This framework allows FSSA case managers and citizens alike to access rich information, from e-government databases. The large number of FSSA databases makes it difficult to query the available information space if an efficient infrastructure is not available. For that purpose, we organize FSSA databases as distributed ontologies. An ontology defines a taxonomy based on the semantic proximity of information interest. Each ontology contains databases that share the same domain of interest (e.g., pregnancy). The use of distributed ontologies accelerates the discovery of FSSA databases. We identified three ontologies in the current prototype: family, visually impaired, and disability. For example, all FSSA databases dealing with families are member of the family ontology. A database can be related to more than one domain of interest and hence be member of more that one ontology.

2.2 Preserving Citizen's Privacy

Privacy is a major concern when it comes exchanging citzens' information. To address this issue, we propose a new technical approach for preserving privacy in government Web services. Requests for services include their users' privacy credentials. These are used by filtering mechanisms in order to ensure that information is

disclosed only to authorized entities. These mechanisms consist of modules that pre-process requests before they are submitted to query engines and handle the requests' results before they are sent to their intended clients

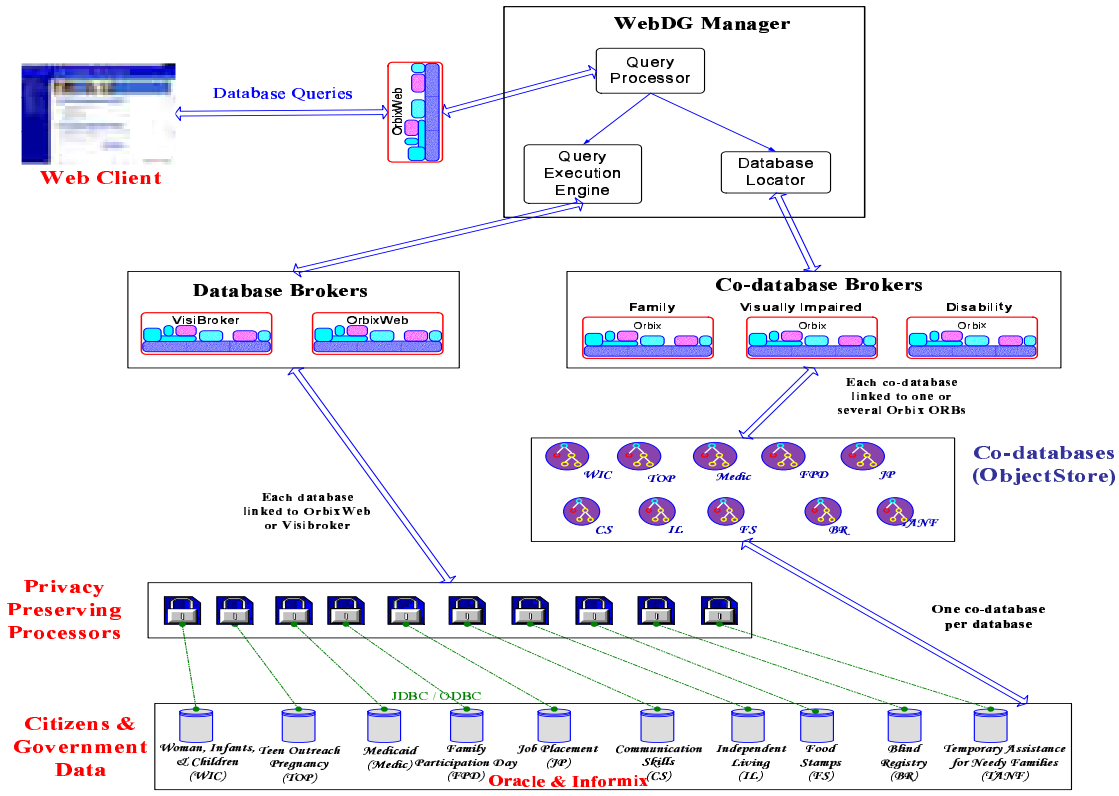

Figure 1: WebDG Architecture

3 WebDG: A System for E-Government Databases and Applications

The different concepts proposed in this project have been implemented in the WebDG system. Figure 1 depicts the different architectural components of WebDG. *WebDG* system is implemented across a network of *Solaris* workstations. Citizens and case officers access *WebDG* via a *Graphical User Interface* (GUI). The current implementation of our system includes JDBC (used to access the relational databases) and three CORBA products that are IIOP compliant, namely Orbix, OrbixWeb, and VisiBroker for Java (see Figure 1). These ORBs connect 20 databases (databases and their co-databases). Each database is encapsulated in a CORBA server object (a proxy). These databases are implemented using three different DBMSs (relational and object-oriented systems): Oracle, Informix, and ObjectStore. The user interface is implemented as Java servlets that communicate with CORBA objects. ObjectStore databases are connected to Orbix. Relational databases (stored in Oracle and Informix) are connected to OrbixWeb and VisiBrojker. CORBA server objects use:

- JDBC to communicate with relational databases. In this case, the CORBA objects are implemented in Java (OrbixWeb or VisiBroker for Java server objects).
- C++ method invocation to communicate with C++ interfaced object-oriented databases from C++ CORBA servers (both Orbix and ObjectStore support C++ interface).