Collaborative Real-Time Information Services via Portals

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INTRODUCTION

The increased use of online services in the commercial world has produced considerable impact on traditional technologies. Traditional information technologies were developed in an era where use of Internet technologies was not widespread. They have a long history and are often based on mature and stable technologies, or practices such as user interface design, artificial intelligence techniques, and so forth. In the era of e-business, business operations are often conducted in conjunction with business alliances and partners through networked activities. Internet (or Web-based) technologies are fulfilling an enabling role to meet the communication and collaboration requirements of e-business. In this article, we share our experiences in how traditional information technologies are coupled with Web-based technologies to gain much-needed leverage in offering e-business solutions. Portals, as the major communication media for Web users, offer opportunities for collaboration using multiple technologies. They also serve as mechanisms for integrating a variety of online services supported by traditional applications. In this article we will discuss the role of portals in application integration for online collaborative service delivery. Particular emphasis will be given to the marrying of the modern roles of portals in e-business with those roles where portals fulfil the traditional roles of front-end technologies. The article demonstrates its vision through a portal-based application integration solution framework associated with a typical application scenario. We demonstrate the effectiveness of using portals in application integration by employing an experimental framework implemented in the PHOENIX research project at Victoria University (http://www.staff.vu.edu.au/PHOENIX/phoenix/index1.htm).

RESEARCH PROJECT BACKGROUND TECHNOLOGIES

Before we describe our solution framework, we outline the background technologies used in our research project. These consist of portal technologies, knowledge management and Web services.

Portals Infrastructure

Portal solutions are heavily reliant on the use of existing applications and infrastructure to improve online services efficiency. Our framework is based on the logical architecture suggested by Britton (2001). This architecture contains three tiers—the presentation layer, the application server layer, and an enterprise information services layer.

The Presentation Layer

The main function of the presentation layer is to provide a unified view of results delivered by different applications that users usually view on browsers. There are common ways to render information content on the browsers such as HTML, plug-ins, applets, and portlets (Britton, 2001). Of these methods, we pay special attention to porlets. Portals use portlets as pluggable user interface components that provide a presentation layer and produce dynamic information displayed on the portal. They run on the Web server that provides content to the Web browser. Portlets also import different services offered by other applications to the front-end by determining the service features to be displayed on the user interface. Thus, portlets provide a bridge to the portal's middle tier. Most portal construction software allows administrators to create their own customised portlets.

Application Server Layer

The presentation layer provides input to the application server layer. Application server refers to software residing beneath the Web server that handles the special designated tasks received by the Web server from end-users. In this layer, business rules are executed triggering possible application integration operations. The application server applies business solution logic and delivers the results back to the Web server before the results are sent to the users' browsers. An application server usually works in an n-tier environment because it performs different roles at different levels. Some of the main roles that the application server provides include back-end application coordination and integration (e.g., applications for taking orders, credit checking, and fulfilling orders), and execution of business logic (e.g.,

related workflow) in response to users requirements. Some commercial vendors have combined the roles of Web server and application server in their products. For example, SAP Web application server combines the roles of standard Web server and application server.

Enterprise Information Services Layer

This layer contains enterprise information systems (EIS) such as CRM systems, database systems, and legacy systems (Britton, 2001). The systems can be located across company boundaries offering potential integration opportunities via a layered infrastructure of portal services.

WEB SERVICES

Web services is an emerging technology that supports application integration across the Internet. The Gartner Group (2001) defines a Web service as: "A software component that represents a business function (or a business service) and can be accessed by another application (a client, a server or another Web Service) over public networks using generally available ubiquitous protocols and transports (i.e. SOAP over HTTP)." That is, once a Web service is deployed, other applications (and other Web services) can discover and invoke the deployed service.

STANDARDS AND PROTOCOLS

The technical standard and protocols for portal applications are sharable with those for Web services. Thus portals and Web services can be combined to offer applications integration solutions across Internet. Some of these protocols and standards include:

WSRP

Web services for remote portlets (WSRP) is a standard that enables portals to access and display portlets that are hosted on a remote server. The WSRP specification defines a Web service interface for interacting with interactive presentation-oriented Web services. The motivations behind the WSRP functionality include: (a) allowing portal servers to provide portlets as presentation-oriented Web services that can be used by engines consuming Web services; (b) allowing portal servers to integrate services from different content providers into a portal framework.

WSDL

Web Services Description Language (WSDL) (Christensen et al., 2001) is used by Web services to describe available services. It provides an effective way for service providers to describe their services. A WSDL definition contains the information necessary for two systems to exchange Web service messages.

SOAP

Simple object access protocol (SOAP) is used for invoking Web services and is based on XML. It provides an envelope for sending and receiving XML data and documents. It allows program components and applications to interact with each other via the HTTP Internet protocol. *SOAP* is platform independent, does not depend on the programming language, is simple, flexible, and easily expandable.

KNOWLEDGE MANAGEMENT SYSTEM

INDEX (Dai & Wright, 1996) is the knowledge management system currently being used in the PHOENIX research project. It is used to coordinate application integration processes and to provide integration knowledge to management services. Integration knowledge guides the system in choosing and invoking the appropriate application packages or services in response to the tasks originating from the portal front-end. It is also used to deliver solutions back to the portal. The knowledge driven approach ensures that users' requests and information services are processed and delivered intelligently. The core services INDEX provides include the goal-directed inference (GDI) and the event-driven inference (EDI). These provide services and knowledge editing facilities, which are deployed as Web services, thus allowing INDEX services and facilities to be assessable remotely across the Internet. GDI and EDI services cover a variety of tasks associated with users' requirements. For instance, when users have well defined tasks in mind, GDI services such as fault diagnosis would be appropriate. If users do not know the specific tasks or problems, EDI could assist them by providing services such as alerts to management. The INDEX knowledge management system has the capability of communicating with external systems or application packages such as portals that serve as application front-ends.

ONLINE COLLABORATION SERVICE DELIVERY FRAMEWORK

The need to tie together incompatible enterprise systems has increased so greatly that many companies have shifted