An e-Card mailing system with Web services

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Abstract: *Recently, Web service has emerged as a promising solution for enabling enterprises to offer service outlets for customized client application. Especially, Web services provide more flexible access to servers than current Web portal sites. This paper will introduce the concept of Web services and illustrate the use and benefits of Web services in the context of an e-Card mailing system. An experimental solution that we implement will be also presented.*

Keywords : *web service, e-Card, integration, interoperability.*

1. INTRODUCTION

Web services [1][2] which are Web-based applications that dynamically interact with other Web applications using open, Internet-based standards. Web services aren't revolutionary, but their standards-based approach to integration and interoperability makes them a candidate for "next big thing". They make corporate portals work, and are the best, most economical way of making content and services available to everyone within a corporation, as well as all of its suppliers and customers.

In this paper, we describe the current Korean e-Card mailing system [3] and explain how Web services can improve it. We will explain the e-Card mailing system and how Web services can be implemented in this system, and provide some proposals for future development.

2. BACKGROUND

2.1. WEB SERVICES

Web services have different layers. Web services are software applications that can be *discovered, described*, and *accessed* based on XML [4] and standard Web protocols over intranets, extranets, and the Internet. Built on XML, a standard that is supported and accepted by thousands of vendors worldwide, Web services first focus on interoperability. XML is the syntax of messages, and Hypertext Transport Protocol (HTTP), the underlying protocol, is how applications send XML messages to Web services in order to communicate. Web services technologies, such as Universal Description, Discovery, and Integration (UDDI) [8] and ebXML registries, allow applications to dynamically discover information about Web services. The message syntax for a Web service is described in WSDL [6], the Web Service Definition Language. When most technologists think of Web services, they think of

SOAP [7], the "accessed" part of our Web services definition. SOAP, developed as the Simple Object Access Protocol, is the XML-based message protocol (or API) for communicating with Web services. SOAP is the underlying "plumbing" for Web services, because it is the protocol that everyone accepts.

Common examples of Web services include data service that provides stock market data or weather forecast data, credit card service that processes credit card transaction to validate a valid credit card, or travel service that provide airline flight schedule, hotel reservation, etc.

The value of Web services is interoperability. We can use the web services technology to solve your business problems. For example, without Web service we have to use either RMI which allows communications only with other Java programs or CORBA which is fairly expensive and difficult to learn for integration to legacy systems. Now, with Web service- through SOAP, applications built with an application server (i.e., Java applications) can now communicate with programs in other languages, regardless of the language in which they are written (provided that language has SOAP support). Moreover, with web service, we can easily interact with server side than current Web portal sites.

2.2. RELATED WORKS

The academic and industrial worlds are already using a number of Web services applications. A typical application is the Web-services-based framework for Integration of Power System Applications [11]. This document examines the integration needs of a Power System application, the challenges of designing a Web services application, and describes the integrated utility information system that resulted.

Another Web-services-based application has been designed for e-Government [12]. The web-service-based application is named "Web Digital Government" (named WebDG) - it offers a comprehensive infrastructure that provides customized government services over the Web while maintaining citizens' privacy. The WebDG manager and privacy-preserving processors compose and preserve e-government Web services.

Web services are developing in two directions. One is an industrial trend that implements Web services to automate business processes through centralized workflow. The other is a research trend focuses on the dynamic composition of Web services. [13][14]

3. MOTIVATION

Korean ePOST site [3] offers an e-Card mailing service which provides customers with a way of sending their congratulations or condolence card through the Internet. Customers can type in their personal information such as name, address, type of card, and message words through a web browser then submit them to the e-Card mailing server. The e-Card mailing server generates an offline card. Korean post office delivers it to recipient's home or office. However, there is a problem in this system if a company wants to send a birthday card to its one thousand customers for the management of customers' relationship. The company has to send the e-Card to one thousand customers by typing their addresses one thousand times. This is a very laborious job. This inconvenience will discourage potential customer companies that want to use the e-Card service for sending bulk of cards to their customers. This problem can be eliminated using Web services. The server defines its API with which a customer company can build its own client software enabling the company operators to upload customers' address accessed from its own database and automatically send the address of one thousand

customers to the server with a single click.

Figure 1 illustrates the system architecture of the current e-Card mailing system. A customer client has to submit many times to e-Card server to send an e-Card mailing to its customers.

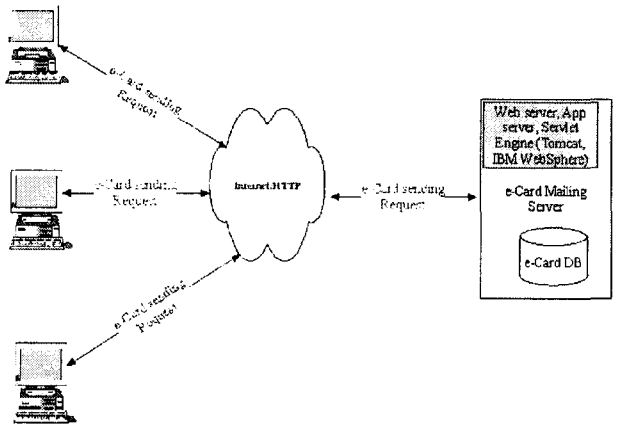

Fig. 1. Current e-Card Mailing System Architecture

4. A NEW e-CARD MAILING SYSTEM WITH WEB SERVICES

4.1. DATA MODEL

A client/consumer sends a message to a server/provider then the provider receives the message, processes it and then sends back a response to the client. Figure 2 depicts this interaction.

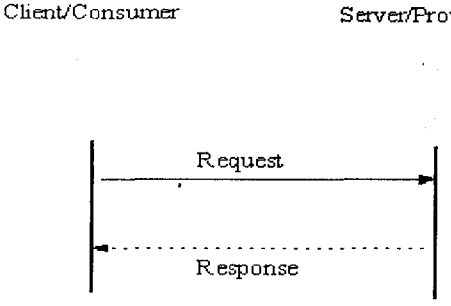

Fig. 2. Web service interaction

When a customer company want to send a card mailing to its customer, it have to send the request about card mailing to get the information such as type of card, image of card by using SOAP [7] protocol, etc, then the server receives these parameters, processes them by selecting the information in its database and returns the result to the client. When customer client decides to choose sending an e-Card, the client with send the XML format data that contains all necessary information such as name, address...etc to the server, the server receives that XML-based data and processes it and call the routine to insert to the e-Card database.

Figure 3 presents the Data Flow Diagram of the e-Card mailing system using Web services

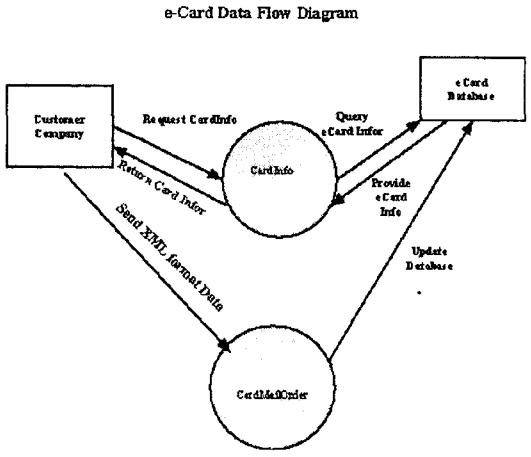

Fig. 3. Data Flow Diagram

4.2. SYSTEM ARCHITECTURE

Figure 4 shows the Architecture overview diagram for the solution. In this architecture, we use Tomcat as Web server, Apache Axis [9] as SOAP engine, and using J2EE platform [10]. All procedures are written in JavaBean.

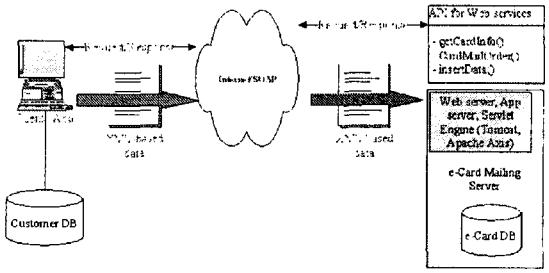

Fig. 4. Architecture of solution

Using SOAP, the client program invokes the Korean e-Card mailing service to connect to e-Card Web service and receives the return e-Card information. It uses the synchronous model which is known as the Remote Procedure Call (RPC) [5] model. One program is calling another remote program or method. Typically, the client program calls the service and passes a small number of parameters. At the completion of the call, the server returns the appropriate values. For the case of our system, the client program will call the procedure names "*getCardInfo()*".

After the client program receives the return values from server, it decides to choose the kind of card, the message word, etc. Then the client sends all information of a group of its customer such as name, address, telephone number...etc - which are selected from the customer company database- in a XML format to the server side to process. It uses the asynchronous model (or document-oriented model). Unlike RPC which relies on frequent invocations with limited data passing (to minimize network traffic per invocation), this model passes a document between the requester and provider. When the server receives the XML format data, it performs method named "*CardMailOrder()*" to update the Database. Then the "*CardMailOrder*()" will call the procedure "*insertData()*" to insert the data into e-Card database.

5. IMPLEMENTATION OF A PROTOTYPE

Figure 5 shows the run-time architecture for a client/server model that uses Web services. Web services infrastructure consists of several layers added on top of the existing J2EE infrastructure.

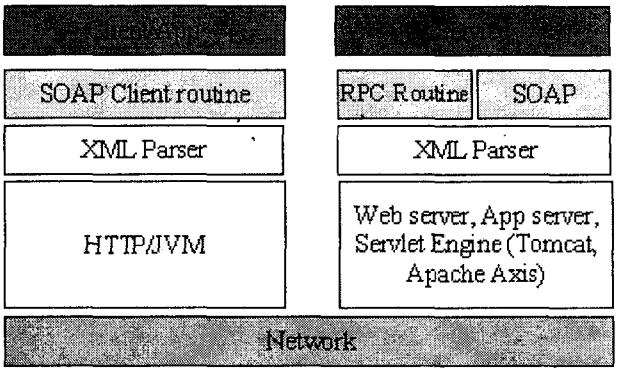

Fig. 5. Imple mentation Environment

- **Client Requirements:**
  - * XML
  - * SOAP
  - * HTTP Support

To facilitate the development, a Web service toolkit supporting WSDL is recommended.

- **Server Requirements:**
  - * XML
  - * SOAP
  - * HTTP Support
  - * WSDL

In our implementation, we use Tomcat and Apache as a Web server and Servlet/JSP engine. Apace Axis is used as SOAP engine. The procedure is written in JavaBean. At the client side, we can use any kind of programming languages and platforms (Windows, Unix, Linux, etc) that support XML, SOAP.

6. CONCLUSION AND PROPOSALS

In this paper we present a Web services solution to a particular business problem (multiple recipients on the Korean e-Card mailing system), to illustrate the benefits of Web services implementations. This kind of a solution is intended as a model and proposal for the development of more complex and useful integration systems for e-Post systems such as ERP, CRM or Logistics system.

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