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Web-service Based Healthcare Information Presentation using Portable Device Over Wireless and Wired Network

Ho Hyun Kang[a], Sung Rim Kim[b], Dong Hoon Han[c], Dong Keun Kim[a] and Sun K. Yoo[c,d,e]

[a] *Graduate Program in Biomedical Engineering, Yonsei Univ*
[b] *Dept. of Internet Information, Seoil College*
[c] *Brain Korea 21 Project for Medical Science, Yonsei University College of Medicine, Korea*
[d] *Dept. of Medical Engineering, College of Medicine Yonsei Univ*
[e] *Center for Emergency Medical Informatics, Human Identification Research Center*

Abstract

In an ubiquitous healthcare domain, mobile computing system using mobile devices such as mobile phones, personal digital assistants (PDA) are carried nearly everywhere by excellent mobility and ease of accessibility. This paper suggests a Web Services based healthcare information support system using portable device over wireless and wired network according to the resources of a given device. When a mobile device requires web services, a mobile context server reconfigures and offers the equivalent contents provided by the web server to suit the required device's resources.

Keywords:

healthcare, wireless, mobile, web service

Introduction

Web services now support a single uniform method for application integration through the Internet at distributed computing environments. In particular, they provide a model for accessing software systems over the web by pointing to their web address (URI), while their public interfaces and bindings are defined and described using an XML standard format. Mobile web services have the following features: interoperability of web services for desktop, internet compatibility, convenient use with small mobile devices, and mobility.

Materials and methods

We presented an overview of the system architecture and the healthcare web service processes at Figure 1. The system is conceptually composed of five main components: the web server, medical information database, mobile context server, mobile user, and desktop user. The web server served medical information for mobile devices on both wired and wireless networks using WSDL (Web Service Description Language) to describe functions and protocols. Figure 2 shows web service sequence diagrams of a mobile device. The mobile context server reconfigures contents offered by the web sever.

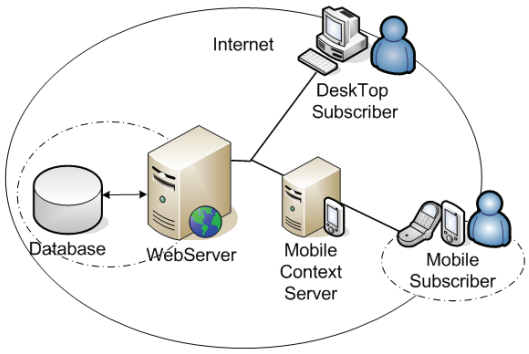


Figure 1 - The system architecture

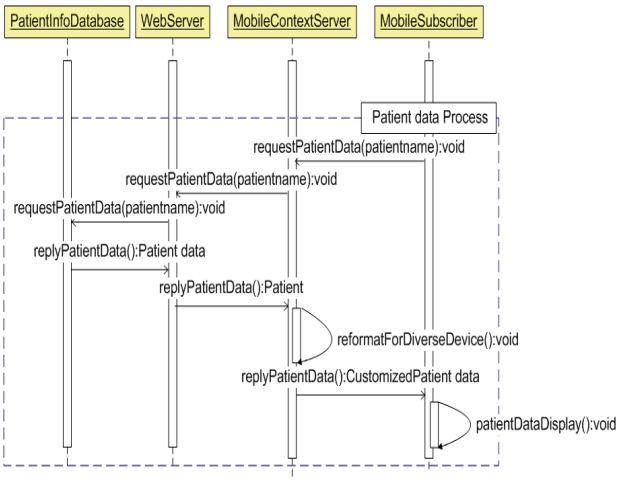


Figure 2 - Web service sequence diagram of a mobile device

The proposed system is not based on loose coupling that is open to UDDI (Universal Description Discovery and Integration) sending and receiving SOAP messages, but rather a tight coupling of a client and server. Using a tightly coupled application development approach provides certain safeguards from quality-of-service, security, privacy, data integrity, and complex transaction processing perspectives as compared to the Web Services architecture. After the system evaluates a mobile device's computing capacity,

the system serves the web contents based on the context chosen by the mobile context server. When a user requests medical information through a wireless network, the mobile context server divides the content pages according to the screen size of the mobile device. It also filters the pages according to mobile devices and then browses the adopted contents from the context server to the mobile web browser.

Results

This system is suggested to aid in faster diagnosis using medical information on both wired and wireless networks. It displays optimized web contents according to the user's browser resources. Figure 3 shows the contents that are displayed on the web browser using a wired network. The desktops shown have an adequate screen size, so web contents can be displayed on one screen.

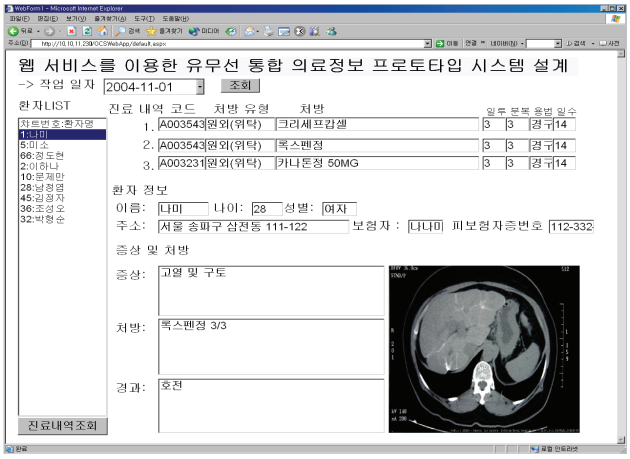
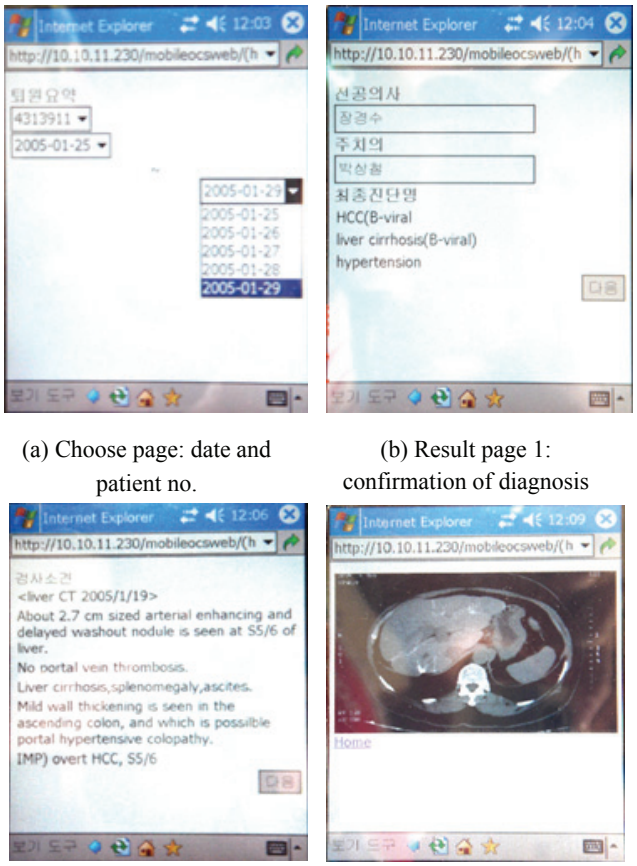


Figure 3 - Web service via a desktop web browser

The web server was served using Microsoft IIS 5.1 and Microsoft Windows XP Professional. Server application was developed by Microsoft ASP.NET based on C#. The medical information database was served by Microsoft SQL-SERVER 2000. The context server connected to the web server acted as the web server. The user system served on the wired network was browsed by Microsoft Internet Explorer 6.0. The mobile web browsers used in the wireless network were a Microsoft MME 3.0 emulator, Microsoft Pocket PC 2003 PDA, HP iPAQ H2200, or LG SC8000.

Figure 4 shows the discharge mobile web pages displayed on a HP iPAQ H2200. This paper suggests an healthcare information support system using Web services for wired/wireless integrated services according to the resources of a given device. The web service is internet friendly, interoperational, and compatible with fire walls. As a result, the web service is considered an important technology to the healthcare system. Our proposed system solves some limits of mobile web services by using a mobile context server that applies context and serves information based on the type of mobile device. Our proposed system is a prototype based on a wired/wireless network. To develop this system from a prototype to a total healthcare system, additional patient information and research is needed, and a greater compatibility with divisions in dynamic web pages.



(a) Choose page: date and patient no.

(b) Result page 1: confirmation of diagnosis

(c) Result page 4: Laboratory finding

(d) Result page 7: MRI image

Figure 4 - Discharge mobile web pages on a mobile device

Discussion

This system solves some limits of mobile web services by using context server that applies context and serves information based on the type of device. So these results will help to implement effective web based mobile health care system. But we think that further research will be necessary.

When regarding particularity of medical information system, security and information standard problem is very important things. Therefore, point of further research must be medical information standard and security. HL7 could

be one of alternative plan. Although security problem was considered in this research, we think that web security must be intensified. Because patient's personal information and other medical data's secrecy is very important. So we will perform aggressive research about web security problem.

To develop this system from a prototype to a total medical care information and research is needed. The system requires greater compatibility with divisions in dynamic web pages.