A Lightweight Mobile Framework for Business Services

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EXECUTIVE SUMMARY

Business Services Networks (BSNs) facilitate a large variety of business service models and business service automation. While mobile computing is becoming increasingly important, issues of extending BSNs for mobile applications have not been addressed. This paper investigates and experiments with a few issues that will occur mostly for supporting mobile applications through BSNs. In particular, this paper will examine service location discovery, service invocation, and information conversion for mobile environments.

Keywords: business services; mobile data; Web services

INTRODUCTION

Various forms of Business Services Networks (BSNs) exist. However, few of them provide a complete framework of IT infrastructure intermediaries, where Web services can be securely published, reused, and invoked, based on some service-oriented architecture standards. However, despite the fact that mobile computing and communication are very popular today, technologies for BSNs that specifically target these mobility applications have not been noticed.

Mobility extends the reach of business processes beyond the conventional boundaries of enterprises. For instance, mobile employees can access business content from anywhere. The flow of content over wireless devices among mobile employees, partners, and customers has revolutionized the way they work, provide services, and conduct business. Therefore, it is natural to imagine the potential benefits of fusing BSN concepts and mobile technologies together.

This paper investigates a few issues that will occur mostly for supporting mobile applications through BSNs. We experiment with these issues by prototyping a BSN test
bed called GreenBSN. Similar to other typical BSNs, the aim of GreenBSN is to allow vendors to sell their software as a service (in particular, mobile service) under a variety of business models and to offer business users a secure network to compose complex business processes.

Due to the hardware limitations of mobile handheld devices (e.g., limited screen size, user-unfriendly keypad, limited memory) and relatively slow/unstable communication channels (Chu, You & Teng, 2004), the following issues have to be addressed in order to ensure the quality of services of GreenBSN: service discovery, service invocation, and information conversion.

RELATED WORKS

Much work and research has been carried out on service discovery, invocation and information conversion on mobile devices. Grand Central Communications (http://www.grandcentral.com) provides the user with a commercial BSN platform and a visualization tool called Process Designer for users to design and implement business processes by integrating existing services as its highlight feature. Unfortunately, Process Designer is not available for the mobile platform. In Ranganathan and McFaddin (2004), it proposed an architecture to integrate workflow in a pervasive computing environment; unfortunately, this architecture does not support workflow composition from the mobile device. In Bolcer and Magi (2000), an architecture (i.e., Magi) has been proposed to address off-line workflow. However, it is relatively heavyweight and not flexible enough to utilize multiple output channels. In Chakraborty and Lei (2004), the paper focuses on the integration of workflow technology and ad hoc collaboration tools such as SMS, IM, and e-mails. It has proposed a system called PerCollab; which allows convenient communication and collaboration mechanisms (i.e., SMS, IM, and e-mail) to support the activities of a workflow.

OVERVIEW

In this paper we have designed and implemented a lightweight server middleware prototype; namely, GreenBSN. The purpose of this server is to provide to mobile users easy access to the services provided by the BSN platform while on the road as well as a better user experience for mobile users when utilizing the resources of the BSN. This server can be run stand-alone (socket mode) or deployed as a middleware layer onto common Web service (http://www.w3.org/2002/ws) platforms. It acts as an agent to enable communication between the mobile device and a BSN backend.

The user can interact with the server via a Web interface or our GreenBSN mobile client, which is named mContext. The GreenBSN server provides a variety of services via the following modules (overview in Figure 1):

- **Adaptive Service Location (ASL) Module.** Allows the user to locate a service from a Google-like interface by inputting keywords. It comes with a ranking sys-
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