Chapter 3.11
Concepts and Operations of Two Research Projects on Web Services and Mobile Web Services

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ABSTRACT

Today, Internet technologies are enabling a wave of innovations that have an important impact on the way businesses deal with their partners and customers. Most businesses are moving their operations to the Web for more automation, efficient business processes, and global visibility. Web services are one of the promising technologies that help businesses in achieving these operations and being more Web-oriented. Besides the new role of the Internet as a vehicle of delivering Web services, a major growth in the field of wireless and mobile technologies is witnessed. Because users are heavily relying on mobile devices to conduct their operations, enacting Web services from mobile devices and possibly downloading these Web services for execution on mobile devices are avenues that academia and industry communities are pursuing. M-services denote the Web services in the wireless world. In this chapter, two research initiatives carried out at Zayed University are presented and referred to as SAMOS, standing for Software Agents for MObile Services, and SASC, standing for Software Agents for Service Composition.

OVERVIEW

Today, several businesses are adopting Web-based solutions for their operation, aiming for more process automation and more worldwide visibility. Thanks to the Web technology, users from all over the world can satisfy their needs by browsing and triggering the services of these businesses. Such services are usually referred to as Web services (Boualem, Zeng & Dumas, 2003). The advantages of Web services have already been demonstrated in various projects and highlight their capacity to

be composed into high-level business processes. For example, a vacation business process calls for the collaboration of at least four Web services: flight reservation, accommodation booking, attraction search, and user notification. These Web services have to be connected with respect to a certain flow of control (first, flight reservation, then accommodation booking and attraction search). Multiple technologies are associated with the success of Web services, namely, WSDL (Web Services Definition Language), UDDI (Universal Description, Discovery, and Integration), and SOAP (Simple Object Access Protocol) (Curbera, Duftler, Khalaf, Nagy, Mukhi & Weerawarana, 2002). These technologies support the definition, advertisement, and binding of Web services.

Besides the Web expansion, we witness the tremendous progress in the field of wireless technologies. Telecom companies are deploying new services for mobile devices. Reading e-mails and sending messages between cell phones are becoming natural. Surfing the Web, thanks to the Wireless Application Protocol (WAP), is another evidence of the wireless technology development. The next stage (if we are not already in it) for telecom and IT businesses is to allow users to enact Web services from mobile devices and, possibly, to make these Web services runnable on mobile devices. M-services (M for mobile) denote these new type of Web services (Maamar & Mansoor, 2003).

It is accepted that composing multiple services (whether Web services or M-services) rather than accessing a single service is essential. Berardi et al. (2003) report that composition addresses the situation of a client's request that cannot be satisfied by any available service, whereas a composite service obtained by combining a set of available services might be used. Searching for the relevant services, integrating these services into a composite service, triggering the composite service, and monitoring its execution are among the operations that users will be in charge of. Most of these operations are complex, although repetitive, with a large segment suitable for computer aids and automation. Therefore, software agents are deemed appropriate candidates to assist users in their operations (Jennings, Sycara & Wooldridge, 1998).

Throughout this chapter, two research initiatives that our research group is conducting at Zayed University are presented. These initiatives are respectively **SAMOS**, standing for **Software Agents for MObile Services**, and **SASC,** standing for **Software Agents for Service Composition**. Both initiatives deal with the composition of services using software agent-oriented approaches. This chapter is structured as follows. The Background section outlines the concepts that are used in our research work, such as mobile computing and software agents. The next section overviews some research projects related to mobile computing. The SAMOS Research Initiative and SASC Research Initiative sections present SAMOS and SASC in terms of architecture, types of agents, and operation. In the last section, we draw our conclusions.

BACKGROUND

Mobile Computing

Mobile computing refers to systems in which computational components, either hardware or software, change locations in a physical environment. The ability to move from one location to another is because of the progress in several technologies: component miniaturization, wireless networks, and mobile-code programming languages. Categories of mobility include (Wand & Chunnian, 2001): hardware mobility, software mobility, and combined mobility. A code that is downloaded from a server to a mobile phone combines both hardware and software mobility. The Overview of Some Research Projects Related to Mobile Computing section provides more details on mobile computing using research projects as examples.