Chapter 12
Enterprise Mobile Service Architecture: Challenges and Approaches

Longji Tang
FedEx, USA

Wei-Tek Tsai
Arizona State University, USA & Tsinghua University, China

Jing Dong
Hewlett-Packard, USA

ABSTRACT

Today, enterprise systems are integrated across wired and wireless networks. Enterprise Mobile Service Computing (EMSC) is a recent development style in distributed computing, and Enterprise Mobile Service Architecture (EMSA) is a new enterprise architectural style for mobile system integration. This chapter introduces the concepts of EMSC, discusses the opportunities, and addresses mobile constraints and challenges in EMSC. The mobile constraints include aspects relating to mobile hardware, software, networking, and mobility. Many issues such as availability, performance, and security are encountered due to these constraints. To address these challenges in EMSC, the chapter proposes seven architectural views: Enterprise Mobile Service, Enterprise Mobile Service Consumer, Enterprise Mobile Service Data, Enterprise Mobile Service Process, Enterprise Mobile Service Infrastructure, Enterprise Mobile Service Management, and Enterprise Mobile Service Quality. Each is described with principles, design constraints, and emerging technologies. In order to illustrate a practical implementation of EMSA, the chapter presents a major shipping and delivery services enterprise as a case study to describe the integration of Service-driven mobile systems in the enterprise.

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INTRODUCTION

In a service-oriented enterprise architecture (Tang, 2011; Tang, Bastani, Tsai, Dong, & Zhang, 2011), there are two major components – services and service consumers. Traditionally, end service consumers access the system mainly through personal computers (PCs), such as desktops and laptops (notebooks) in an end-to-end system. With development of wireless communication and technologies, such as 3G and 4G (Amjad, 2004; Choi, Dawson, & La Porta, 2010), mobile and non-PC devices (tablets and others), such as iPhone, iPad, iPod, and Android-based mobile devices are overtaking PCs as the most widely used communication and Internet access devices. Canalys reported that 488 million smart phones were shipped in 2011, compared to 415 million client PCs that were shipped by vendors in its report "Smart phones overtake client PCs in 2011" (Canalys, 2012). Moreover a recent IDC report revealed that PCs will slip in market share from 35.9% in 2011 to 25.1% in 2016, as Android-based devices will grow from 29.4% share in 2011 to become a market leader in 2016 with 31.1% share. Devices running iOS will grow from 14.6% to 17.3% market share by 2016 (IDC, 2012).

Mobile devices are becoming the major interface for consuming services that are not limited to general phone services, but also include email, internet, entertainment, and social media services. Recently, use of enterprise services, such as mobile search, mobile ecommerce (M-commerce) (Amjad, 2004) - shopping and shipping, and mobile payment, from mobile devices are growing rapidly.

Enterprise mobile computing began from first-generation smart phones such as IBM Simon Personal Communicator, the first smartphone released in 1993 (Esposito, 2012). The IBM Simon had a simple operating system called DatalightROM-DOS, 16 MHz CPU, 1 MB RAM and 1 MB storage. Its features included sending and receiving facsimiles, e-mails and cellular pages. It also included many applications including an address book, calendar, appointment scheduler, calculator, world time clock, electronic note pad, handwritten annotations and standard and predictive touchscreen keyboards. Around the same time, there were significant developments in Europe and Asia too. For example, Nokia N9000 Communicator came to the market in 1996 and offered pretty much the features that IBM Simon offered but had a mechanical keyboard instead of the touchscreen keyboard. Many generations of communicators followed. The first "Symbian" smart phone was Nokia N9210 in 2001. These devices were based on the Symbian OS that was a multitasking OS, supported video capturing and viewing, had browsers, navigation software, email clients, etc. Several handsets from Korea and Japan also came to the market that used Symbian OS since 2001. The first generation mobile devices also included Palm Treo 600, and first generation Blackberry, etc.

The modern era of Enterprise mobile service computing started with the release of the Apple iPhone in the summer of 2007 (Esposito, 2012). The iPhone defined a new generation of smart phones. Smart mobile devices, such as Apple iPhone, Google Android devices, Microsoft Windows 7 and Windows 8 smart phones, have a multitasking operating system (Firtman, 2010), a full desktop browser, Wireless LAN (WLAN, also known as Wi-Fi) and 3G/4G connections, a music player, and supported several of the following features (Firtman, 2010): Mobile Web, GPS (Global Positioning System) or A-GPS (Assisted GPS), Digital compass, Video-capable camera, Bluetooth (Firtman, 2010), Touch and gesture support (Firtman, 2010) that allowed an user to touch a screen or make a movement to issue commands, 3D video acceleration, and Accelerometer.

The features and capabilities of modern smart phones and smart mobile devices (including tablets, iPad, and iPod) provide a portable channel to connect to enterprise services through mobile