

Essential Technologies and Methodologies for Mobile/Handheld App Development

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INTRODUCTION

The emerging smartphones have created many kinds of applications that are not possible or inconvenient for PCs and servers, even notebooks. Mobile application stores (or app stores) sell or provide mobile applications/services for handheld devices such as smartphones or tablet computers. The applications/services are not necessarily from the storeowners. Many of them are from the third parties such as independent developers. A wide variety of mobile applications is available on the stores. Popular applications include location-based services, mobile games, mobile offices, and music. Many of the apps are free and most of them just cost few US dollars each. App stores have existed since the launch of handheld devices in the '90s, but their scales were relatively small. The stores were normally set up by device manufacturers and the number of its apps was small like hundreds. When Apple launched its iPhones in 2007, they opened an App Store subsequently in 2008. They claimed the store has over 50 billion apps download, and has paid out more than \$15 billion to developers since its inception. There are more than one million apps available in 2013 (Apple, 2014). The highly popular iPhones help the sales and development of applications. On the other hand, the large number of apps helps the sales of iPhones too. It is a win-win situation for both of the Apple, Inc. and app developers. Witnessing the success of the App Store, other mobile operating system providers realized they might be left behind if they did not have this kind of stores for their operating systems. They set up their own app stores immediately. Some of the major stores

are given in Table 1 (Hu, 2014). The highly popular apps create great opportunities for IT companies and workers. However, traditional desktop programmers have problems switching to handheld programming because it requires a different approach from desktop programming (Kiely, 2001). This chapter introduces essential technologies for mobile/handheld computing, so more IT workers can join the mobile trend of computing.

Desktop application developers use standard tools or software (such as C++ and Java compilers) to develop applications for different platforms (like Linux and Windows) with little or no changes. Unlike desktop application development, there are no widely accepted tools or software for mobile app development. For example, completely different approaches are required for Android and iOS app development. At the same time, mobile app development is much more complicated and platform-specific compared to desktop application development. This chapter introduces mobile app development by giving a simple Android application. Mobile developers can get a sense of mobile app development by reading this chapter and apply it to other platforms or further explore the Android app development.

The rest of this chapter is organized as follows. Section 2 gives background information about mobile/handheld computing, which includes a generic system structure of mobile handheld devices and client-side handheld computing. A variety of approaches is available for mobile app development. Section 3 introduces a simple app development using Android. The example includes several XML and Java files and the Eclipse

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Table 1. Major mobile application stores

Company		Mobile Application Store		
Name	Major Mobile Products	Name	Major Operating Systems Supported	Launch Date
Apple, Inc.	Smartphone Mobile operating system	App Store	iPhone OS	07/10/2008
Amazon	E-reader	Appstore	Android	03/21/2011
GetJar	None	GetJar	Almost all	xx/xx/2004
Microsoft	Mobile operating system	Windows Phone Apps+Games Store	Windows Phone	10/06/2009
Nokia (Symbian)	Smartphone Mobile operating system	Ovi Store	Windows Phone	02/16/2009
Open Handset Alliance (Google)	Mobile operating system	Google Play	Android	10/22/2008
Palm (HP)	Smartphone Mobile operating system	App Catalog	WebOS	06/06/2009
Research In Motion	Smartphone Mobile operating system	BlackBerry World	RIM	04/01/2009
Samsung	Smartphone Mobile operating system	Samsung Apps	Android Bada Windows Phone	06/xx/2010
Sony	Smartphone	Apps	Android Symbian Windows Phone	02/xx/2004

IDE (Integrated Development Environment) with an Android plugin is used in the development. The final section summarizes this study.

BACKGROUND

Handheld computing is the use of handheld devices like smart cellular phones to perform wireless, mobile, handheld operations such as browsing the mobile Web and finding the nearest gas stations. It is an essential part of location-based services. This section discusses two handheld computing subjects: mobile handheld devices and client-side handheld computing.

MOBILE HANDHELD DEVICES

Mobile users interact with mobile commerce applications by using small wireless Internet-enabled devices, which come with several aliases such as handhelds, palms, PDAs, pocket PCs, and smart phones. To avoid any ambiguity, a general term, mobile handheld devices, is used in this chapter. Mobile handheld devices

are small general-purpose, programmable, battery-powered computers, but they are different from desktop PCs or notebooks due to the following special features: (1) limited network bandwidth, (2) small screen/body size, and (3) mobility.

Short battery life and limited memory, processing power, and functionality are additional features, but these problems are gradually being solved as the technologies improve and new methods are constantly being introduced. The limited network bandwidth prevents the display of most multimedia on a microbrowser. Though the Wi-Fi and 3G networks go some way toward addressing this problem, the wireless bandwidth is always far below the bandwidth of wired networks. The small screen/body size restricts most handheld devices to using a stylus for input. Figure 1 shows a typical system structure for handheld devices, which includes the following six major components (Hu, Wiggen, & Yang, 2005):

- **Mobile operating systems:** Simply adapting desktop operating systems for handheld devices has proved to be futile. A mobile operating system needs a completely new architecture and

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