Chapter 12
Multi-Device RIAs Development

ABSTRACT

Web 2.0 applications are becoming ubiquitous applications (i.e., applications that can be accessed by anyone, anywhere, anytime, using any device). A key element of these ubiquitous applications is mobile devices. In fact, the involvement of mobile devices such as smartphones and tablet computers in the development of Web 2.0 applications has resulted in a new kind of Rich Internet Application (RIA) that can run on a variety of devices starting from the same code base, and it is known as multi-device RIA. The term multi-device RIA embraces not only mobile applications but also other kinds of out-of-browser applications such as cross-platform desktop applications as well as the traditional cross-browser Web applications. This chapter formalizes the concept of multi-device RIA, and then it presents an overview of the capabilities of several multi-device development frameworks. This review is finally summarized in a comparative analysis.

1. INTRODUCTION

In recent years, Web applications are becoming a common usage thanks to the great variety that they have. The new trends on RIAs development are basically divided into two aspects: 1) the cloud computing which enables the applications to be distributed and; 2) incursion of RIAs on mobile devices. The second aspect has the greatest interest in this chapter due to the large number of mobile device users and because users have greater access to mobile devices than an Internet-connected personal computer.

A mobile device is a small and hand-held computing device. Cell phones, smartphones, tablet computers and PDAs are examples of mobile devices, which can differ in the quality and range of features. For classification purposes, these devices are categorized by levels of functionality made by T38 DuPont Global Mobility Innovation Team in 2005. Under this classification, three types are well-known: 1) Limited Data Mobile Device, 2) Basic Data Mobile Device and 3) Enhanced Data Mobile Device. A mobile device with an operating system embedded almost as powerful as one of a desktop computer is included in the third category. In fact, modern mobile operating systems integrate the features of a desktop operating system with the support for touchscreen, Bluetooth, GPS, video camera, audio recorder, music player, among others.
Therefore, there are mobile devices with different operating systems and hardware features for all needs and budgets. This chapter presents a systematic review of multi-device RIAs development.

2. MULTI-DEVICE RIAs

Mobile devices such as smartphones and tablet computers have recently been involved in RIAs development because of the ubiquitous requirements of Web 2.0 applications (Kappel et al., 2003). In this sense, RIAs are known as multi-device RIAs. This term covers RIAs that run as cross-browser Web applications, cross-platform desktop applications and applications for diverse mobile devices.

The operating systems on mobile devices have increased in number of ways in the last couple of years. These devices are becoming more integrated with the same functionalities of a small computer. Among the variety of operating systems for mobile devices are: Android™ developed by Google™ Inc.; iOS™ developed by Apple™ Inc.; and Windows™ Phone developed by Microsoft™ to mention but a few. A brief description of the most popular mobile operating systems is presented below.

- **Android™** is a mobile operating system based on a modified Linux kernel. It was initially developed by Android™ Inc, which was purchased by Google™ in August 2005. Android™ is currently developed by a consortium of diverse hardware, software and telecommunication companies such as the Open Handset Alliance, which is led by Google™. Google™ released the Android™ source code as open source, under the Apache License V. 2. Nowadays, Android™ has the major smartphone market share worldwide, it also runs in tablet computers. Applications for Android™-based devices are usually developed in the Java programming language by using the Android™ SDK.

- **Apple™ iOS**, formerly called iPhone™ OS, is a mobile operating system developed and distributed by Apple™ Inc. It is based on the XNU hybrid kernel which is used by the Mac OS X operating system, also property of Apple™ Inc. iOS was released under a proprietary software license, which restricts the installation to Apple™ hardware devices such as iPod Touch, iPhone, iPad and Apple™ TV. Apple™ Inc. allows third-party developers building Objective-C applications for iOS and Mac OS X operating systems by using the Xcode Integrated Development Environment (IDE) which can be only installed on Mac OS X desktop computers. However, deploying third-party applications on Apple™ devices is only possible after of paying an Apple™ developer program fee.

- **Windows™ Phone** is a mobile operating system developed by Microsoft™. It is the successor of the Windows™ Mobile platform, which was primarily aimed at the enterprise market. The latest version is called Windows™ Phone 8, which is based on the Windows™ NT hybrid kernel. Windows™ Phone was released under a proprietary software license and it is used by multiple manufacturers such as HTC Corporation, Samsung Electronics and Nokia Corporation in multiple smartphones. Moreover, Microsoft™ provides two frameworks for developing applications for Windows™ Phone-based devices: the Silverlight™ framework, which allows developing XAML-based RIAs and the XNA framework, which allows building video games for all Microsoft™ gaming platforms.
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