Formulating of Smart Phone Application using HTML5 based Cross Platform Framework

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Abstract: ***The mobile operating systems (OS) used by modern smart phones are too diverse such as Google's Android, Apple's iOS, Microsoft's Windows Phone, and so on. Smart phone application development is done using native platform such as iPhone using Objective-C, Android using Java, Windows Mobile using C# and so on. Therefore, a cross-platform framework which supports 'Write once and deploy everywhere' is required to support the development of smart phone applications. This paper presents the HTML5-based cross platform framework which uses PhoneGap and Webkit to support the development of smart phone applications that are written as Web applications. This paper investigates the benefits and drawbacks of cross-platform mobile app development by developing a smart phone app using the PhoneGap framework. A web based thesis app is created for use on Android, iPhone and Windows Phone smart phones. The implementation of the app is based on a single codebase of the standard web development technologies - HTML, CSS and JavaScript. The application supports Android version 2.2 or later and for iOS version 4.2.1 or later is accepted. On Windows Phone the application is designed to be operational from version. The compatibility of the application on any tablets is not tested. The result will reveal problems that may encounter and notable issues that one must take in consideration when using the software development method of cross-platform.***

Keywords: App, Mobile application, Cross-platform, Multi-platform.

1. Introduction

Applications for smart phones, mobile apps, are in a stage where they have to exist on multiple platforms in order to reach out to as many users as possible. Developing in native languages for multiple platforms requires more resources for software development companies which will also result in higher expenses. Through cross-platform, developers can create applications for multiple platforms using the same code base. Cross-platform development uses common programming languages that smart phones implement - HTML, CSS and JavaScript.

Figure 1: Getting the Proposal

The mobile operating systems (OS) used by modern smart phones include Google's Android, Apple's iOS, Nokia's Symbian, RIM's BlackBerry OS, Samsung's Bada, Microsoft's Windows Phone, Hewlett-Packard's webOS, and embedded Linux. Such operating systems can be installed on many different phone models, and typically each device can receive multiple OS software updates over its lifetime. In general, there are three different solutions for smart phone development: 1) native, 2) Web, and 3) hybrid. Native application is the application that works natively. Native application code is written specifically for a particular phone's operating system. In native development, smart phone application development is basically done using native platform say iPhone using Objective-C, Android using Java, Windows Mobile using C# and so on. Web application is the application that renders via a Web browser using Web application solutions including HTML, CSS, and JavaScript. There are three specific techniques in Web application development that are borrowed for these non-Web frameworks: 1) layout with mark-up (HTML5/CSS); 2) using URLs to Proceedings, The 5th International Conference on Advanced Science and Technology identify screen layouts and visual state; and 3) incorporating dynamic languages, such as JavaScript and Ruby. Hybrid application is the combination of a native application and a Web application. Smart phone frameworks are influenced by the rapid application development techniques we are seeing in Web development today. Different smart phone operating systems come up with their own App store for distributing native application. There are some issues associated with the native application development such as, Out-of-sync data, No two mobile platforms share a mobile application, and there are too many mobile operating systems exist in the market such as iPhone, Android, Blackberry, Symbian etc. Same application needs to be developed for different platform differently. This increases development cost. The best approach to create truly cross-platform app is to use HTML5 and JavaScript based on cross-platform frameworks. One interesting framework for creating HTML5/JavaScript based apps is PhoneGap and Webkit. It has quite many API's available and wide support for different platforms.

1.1 Problem

The authors intend to develop an application for smart phones by using the cross-platform method with the PhoneGap framework and from there investigate what differences there are between each platform and compare benefits and drawbacks of using cross-platform.

1.2 Purpose

The purpose of this paper is to investigate the feasibility of cross-platform software development for mobile devices by implementing an app with the PhoneGap framework. The app was requested by the consultant company Squeed that hosts the conference dev: mobile for mobile developers. For this conference there was a need for a mobile application for Android, iPhone and Windows Phone smart phones. By accepting the assignment to develop the thesis app, the authors aimed to become more competent in cross-platform mobile app development and app market distribution.

1.3 Disposition

This paper is divided into certain sections where different topics are presented and discussed. The thesis starts with an introduction of the problem and purpose of the entire study as mentioned earlier. In section two, the method of how the authors intend to solve the problem is introduced. The third section covers the background by starting with a brief description of the smart phone market, and then continuing with an explanation of the technical environment of the project, by addressing the different areas vital to the subject. In the fourth section, the application implementation concepts and design models are outlined. The section also features a description of the testing process of the app. After the theoretical sections the authors continue with the achieved practical results, section five, where the author's choice of GUI design is depicted. In section six the authors elaborate, with help of the theoretical and practical work within the study, the conclusions and limitations of developing mobile apps in the cross-platform.

2. Related Work

There are constraints to be considered in selecting a native platform compared to the cross-platform. Table 1 shows the advantages and disadvantages of using native platform versus cross-platform environments

Table 1: Native platform vs. cross-platform

	Native	*Cross-Platform*
Advantages	1. Library update 2. Direct technical support 3. Stable 4.App store and device portal solution 5. Better UI design result, can take full advantage of display	1. Write once, run a lot of places 2. Open Source solution 3. One programming language family for all 4. Fast development 5. Reduced long term maintenance cost
Disadvantages	1. Not all have Open Source solution 2. Different programming language 3. Slow development time 4. Requires many budget and experience	1. Limited direct technical support 2.Unstable 3.UI design depends on the platform and is limited

3. Development environment

There are several development environments for developing with HTML, CSS and JavaScript. They provide almost all desired functionality such as auto-completion. Installing the software development kit (SDK) of the desired platform is mandatory for the use of an emulator, although, for a first impression, a desktop-browser might be enough. In summary, the maturity of development tools is high. Software support for debugging and testing is excellent; in most cases tools like Firebug can be employed in addition to a regular browser.

3.1 GUI Design

This criterion covers the process of creating the graphical user interface (GUI), especially its software-support. A separate WYSIWYG editor and the possibility to develop and test the user interface without having to constantly "deploy" it to a device or an emulator are seen as beneficial.

3.2 HTML5

HTML5 is the fifth version of HTML, a language used to structure and present content for the World Wide Web. It aims to improve HTML4 by adding new features and support to it. HTML5 is a response to various incompatibility issues and syntax errors from previous HTML versions.

3.3 Maintainability

A good JavaScript framework enables short and elegant code. Functionality like sorting of data can sometimes be inserted by using a single keyword. The underlying framework will then supply all necessary methods. The LOC indicator for the prototype application was lowest for the mobile Web application.

3.4 Scalability

Web apps in general can easily be split into a large number of small files that fit into the overall design. This might again depend on the framework employed. Project using jQuery; for example, tend to become confusing from a certain size, while others support modularization very well.

4. Opportunities for further development

A project started as a Web app can easily be ported to Phone Gap if access to the native API should become necessary. It might also be packaged with a Web View control in Titanium Mobile or as a native application, although both would contradict the "native" character of these apps and not provide all of the advantages of these approaches. Altogether, opportunities for further development are excellent.

4.1 Speed Cross-Platform Framework

Evaluates the speed of the development process and factors that hinder a fast and straightforward development. Costs are not explicitly estimated because they are taken as being dependent on the speed of development, assuming that one can abstract from differences in salary of a JavaScript or Java developer. We introduce the cross-platform for smart phone applications as show. Our cross-platform framework uses HTML5, PhoneGap, Webkit, and so on. PhoneGap is an open-source tool that lets you use JavaScript, HTML, and CSS to code an application once, then deploy it to the iPhone, Android, and BlackBerry. It is support to give Web developers JavaScript access to popular mobile device features, like the smart phone Application Development using HTML5-based Cross-Platform Framework

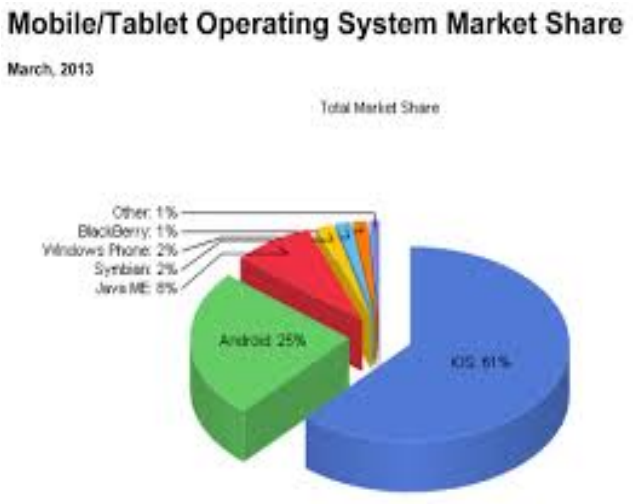

Figure 2: Mobile / Tablet Operating System Market Share

JQuery plug-in for mobile Web development with native animations, automatic navigation, and themes for mobile Webkit browsers on the iPhone, Android, iPod Touch, and other forward-thinking devices. Webkit is an open source library that renders HTML on the page. The iPhone and Google Android both use Webkit directly. Ajax (Asynchronous JavaScript and XML) is a group of interrelated web development techniques used on the client-side to create asynchronous web applications. With Ajax, web applications can send data to, and retrieve data from, a server asynchronously (in the background) without interfering with the display and behavior of the existing page. JSON (JavaScript Object Notation) is a text-based open standard designed for human-readable data interchange.

5. Conclusion

Gartner expects enterprise investments in mobile application development to increase at a rate of 20% to 30% per annum through 2015 to meet the rising demand for custom applications. Cross-platform mobile application development tools and frameworks that help to reduce the cost of development and improve time to market of mobile applications will continue to be a key focus area. It is therefore important to perform a holistic evaluation of options, not only from a technology stand-point, but also taking into consideration longer term requirements and market momentum. However in this period of innovation and associated chaos, it is also important to remember that cross-platform approach, vendors and business models will continue to evolve further for the next 1-3 years based on progress in underlying standards and technologies and maturing of application requirements. What is clear is that the role of cross-platform tools in the long term in enabling and supporting mobility solutions is undeniable and those tools that promote open standards and help avoid lock-in will find favor. A periodic review of mobile application development approach and investments every six to twelve months is highly recommended.

Accenture, as part of its Application Factory offer, performs a holistic evaluation of cross platform application development tools and frameworks and applies the learning's to recommend suitable solutions based on the client's business context. It also refreshes its assessments periodically based on tool improvements and newer solutions. Finally, as is the case with any innovative solution, people tend to overestimate its impact in the short term, but under estimate its significance in the longer term. The final set of solutions that will emerge from this period of flux will help customers harness the full potential of mobility solutions.

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