

## **TOWARD THE DEVELOPMENT OF CROSS-PLATFORM MOBILE APPLICATIONS**

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### **ABSTRACT**

The problem of developing mobile application is that there are lots of mobile operation systems available and each of them has a big share of this market. Hence if a programmer wants to develop its own application, he/she has to write it in different programming language to have an application available in different mobile operation systems and this will take lots of development time and needs the knowledge of different types of mobile programming languages. However there are some frameworks that let the developers to write their mobile applications codes in one programming language and have it work in different type of operation systems. Two of these progressive frameworks are Phonegap and JQuery mobile. In this paper author critically evaluates these frameworks and shows how these frameworks can be used in development of cross-platform mobile applications.

**KEYWORDS:** Cross-platform, mobile applications – phone gap – JQuery mobile

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### **Introduction**

By growing usage of cell phones and development of mobile processors, mobile device manufacturers are able to produce more powerful devices. Today mobile devices' processors and memories are as powerful as desktop and laptops computers of 3 years ago. Hence mobile applications are becoming more and more popular (Palmieri et al. ,2012) . By growing usages of mobile devices and smart phones, more and more mobile applications are used by people and there is a big market for developing mobile applications. Currently there are more than ten mobile operation systems available and each of them requires their own programming language to develop its native applications and this is one of the challenges developers are facing. It is necessary for developers to have their applications working on different mobile devices if they want their applications become widely usable. To reach this developers have two options, first is to start to write they mobile applications from scratch in different type of programming language of mobile operation systems and second is to use cross-platform mobile application framework which let them to write their programs once and have it available on different mobile operation systems. The objective of this paper is to evaluate two progressive frameworks, Phonegap and JQuery mobile to be used in producing cross-platform applications.

## **Evaluating Phone gap framework**

Phonegap first was used to run HTML codes in IOS in 2008, the whole idea of it was to produce a framework that enables web developers to write their code in Html and JavaScript codes and be able to run it in iPhone IOS, without knowing IOS programming language which is XCode, However later it was extended to other operation systems and acquired by adobe. Phone gap is properly able to tackle the problem of writing different programs to have one application work on different type of mobile operation systems, its aim is to make developers able to write one time code and able to use it in different mobile operation systems instead of writing code for each operation system separately. Phonegap enables developers to access cellphone devices such as camera, GPS, Accelerometer and Compass. Programmers using Phonegap will be able to write their own programs using only HTML and JavaScript codes based on the Phonegap java script framework structure. The code will be converted to the native mobile operation system code using Phonegap build compiler which is an online tool. Moreover Phonegap enables developers to use local and remote databases. With simple line of code developers can create local SQLite database and easily perform transaction statements on them using select, delete, and update and insert. Access to file system, contact list, microphone and other media of all kind of mobile devices is another advantage of Phonegap.

Additionally Phonegap framework includes set of events that programmers can use to trigger them functions whenever these events happens. Events such as device ready , which triggers when phone gap library is completely loaded and “pause” when users gets out from app and “resume” which triggers when users comeback to the application and “offline” when users internet connection is lost and “backbutton” when users hits back button of its device is some the events that Phonegap provide to developers. Informationsuch as application version, application description and author name are editable in config.xml file. Although Phonegap provides lots of functionality and cross-platform to mobile applications one of its disadvantages is that when users wants to move from one HTML page to another, because of the compile time, end user might experience a lag .Hence it is better to avoid to use lots of HTML pages in Phonegap applications or try to use Ajax requests instead of moving into different HTML pages.

## **Evaluating Test environment of cross-platform mobile applications**

Developers that use Phonegap applications to develop their applications, can benefit from different type of test environments to test their applications before publishing them. One of the most convenient tools to test Phonegap applications is Ripple, it is a google chrome extension and it creates a virtual machine based on the apache Cordova. Hence developers can easily write their applications using HTML5 and JavaScript and then run it on google chrome having enabled Ripple to test them. Although Ripple is still in beta version it provides a good and easy experience to the developers and unlike other test environments such as google SDK developers does not require to install lots of programs such as java and google SDK to run virtual machine in their computers.

## **Publishing cross-platform applications**

To publish Phonegap applications, developers can use Phonegap build online compiler. Phonegap build belongs to Adobe Company and developers can put all their mobile apps files in to a zip file and upload it to phone gap build websites. Then online compiler will convert HTML

and JavaScript codes to the native operation systems codes such as windows mobile, android and IOS and let the users to download their own ready to install (package) files. However if developers wants to put their applications to online store such as google play, they have to obtain a key from google play and put it to the Phonegap build website before building their application online. Besides Phonegap build website allows users to customize the icon of their application in addition to enable hydration which enables the applications to check each time they run the available updates and if there is a newer version of the application available users will be asked to upgrade their application. In addition to online Phonegap build cloud service, developers can download Phonegap package form its website and build their application offline. Although phone gap build cloud service is much more convenient is lacks of some features of Phonegap, for example when using cloud service developers are restricted to compile their applications only to windows mobile, android and IOS , while when using offline Phonegap package other type of mobile operation systems such as blackberry is available.

### **Evaluation cross-platform Interaction design**

Although phone gap is extremely powerful framework that enables developers to write codes in HTML and JavaScript and get their applications works in different devices, it cannot be used for interaction design. Like other websites, developers has to write HTML and CSS codes to design the interface of their applications. Because mobile devices use different size of screens, it is important that the interface elements and structure can fit to all the screen sizes and have a good accessibility in all devices. To reach that it requires lots of CSS codes and can takes lots of development time, Hence researcher suggests developers to use a JQuery mobile framework for interaction design.

### **Role of JQuery mobile framework in cross-platform mobile applications**

JQuery mobile is a framework containing HTML5 and JavaScript codes and it provides enhanced touch abilities and responsive design (Firtman and Maximiliano,2012). To use JQuery mobile, developers has to include its JavaScript library code in addition to JQuery library to their applications (because jQuery mobile is based on the JQuery both libraries has to be included in the project). As soon as the JQuery mobile frameworks adds to the application the look of it will be changed. After JQuery mobile successfully added to the application, developers can use “data-role” tag to form elements. Data-roles such as “page”, “header”, “footer” and “button” can produce touch, responsive and beautiful elements of the page that lets developer create their cross-platform mobile applications more easily.

On the other hand another advantages that JQuery mobile has, is that after JQuery mobile library adds to the page, all the requests such as button click will send as AJAX request. Hence this will improve the performance of the pages. Additionally as before stated, in Phonegap applications when users move from one HTML page to another they might experience a lag. However by implementing JQuery mobile because its requests are based on the AJAX this problem will be solved.

JQuery mobile provides different type of events in addition to the available Phone Gap events to the application. As the result Developers can implement these events to enhance their applications efficiency. Events like “scroll start” will trigger when user start to scroll the page , “swipe left” and “swipe right” events will trigger when users swipe the page to the left or right .

“Tap” event is another useful event in jQuery mobile that triggers when users tap on the screen. Moreover “orientation change” event triggers when phone orientation changes. All these events and other events that includes in jQuery mobile framework can help developers to produce more efficient and cross-platform applications.

## **Conclusion**

To sum it up Cross-platform mobile application development will let developers to publish their applications to all the available operation system with just one time coding .although in some of operation systems some of the features of phone gap will not work, developers might change only that parts of the application to get it work, but it does not requires developer to write from scratch. Additionally there are lots of 3th party APIs and frameworks available for phone gap to let the developers create their cross-platform applications more easily.

In conclusion, in this paper author has critically reviewed and evaluated jQuery mobile and Phonegap frameworks that lets the developers to produce cross-platform mobile applications. Additionally some of the advantage of developing cross-platform applications has been reviewed and some of the limitations of this type of applications was discussed. Moreover it was showed that how using Phone gap in addition to JQuery mobile in one application increase the features of a mobile applications to produced more complete and powerful cross-platform mobile applications.

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