

A Review Paper on Cross Platform Mobile Application Development IDE

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Abstract: *Cross Platform Mobile Application Development is the development of mobile based applications so that the development of these types of applications can be made platform-independent. A review has been made in this field while considering Integrated Development Environment is being proposed which will help a software developer to code an application in a single code base and deploy that single code base to multiple operating systems meaning if a developer codes in Java for Android, the developer can deploy the same Java code to iOS[6] subsystem. First the development of a operating system compatibility architecture which helped to run unmodified iOS binaries on Android operating system and second phase of proposed solution helped to understand the cross-platform application development tools which are currently available in the market. The third step is to understand such cross-platform development tools in more detail and finally a mathematical model based application.*

Keywords: *Cross-Platform Mobile application development, IDE, Android development, iOS development, Cross-Platform.*

I. Introduction

Mobile application development in recent times is growing exponentially. Today each and every person in this world has a smart-phone in his pocket. Smartphone's combine a range of functions such as media players, camera and GPS with advanced computing abilities and touch screens are enjoying ever increasing popularity. Smartphone's help us to achieve a range of tasks through something known as applications or Apps to short. According to Gartner [3], Google's Android, Apple's iOS and RIM's Blackberry all have at least a 10 percent market share. For completing this review paper and study about this topic a total of four research papers were used which helped to understand conceptual and current scenario of Cross-platform mobile application development.

CIDER is basically an operating system compatibility architecture that can run applications built for different mobile ecosystems preferably iOS and Android together on the same Smartphone or tablet. Basically in simpler terms CIDER had the ability to run unmodified iOS binaries on the Android subsystem without any sort of modification. Cider achieves the task of increasing the capacity of home Android kernel by simultaneously using the home kernel and the slave kernel which is the application binary interface in our case. User space of the slave kernel gets in contact with the Cider enabled kernel in exactly the same ways as the slave kernel. That is, the iOS applications get in to Linux based kernel approach as if they are working on a home kernel of iOS subsystem which is running on a typical iOS based device. Instance of a foreign kernel, and reuse and run unmodified foreign user space library code. Now coming to the architecture of these two operating systems. iOS runs on ARM CPUs like Android, but has a very different software ecosystem. iOS is built on the XNU[8] kernel, a hybrid combination of a monolithic BSD kernel and a Mach microkernel[5] running in a single kernel address space. When we talk about Android, Each Android app is compiled into Dalvik[4] byte code (dex) format, and runs in a separate Dalvik VM instance.

Now Comparison of latest cross-platform mobile application development approaches which are currently available in the market. Some of the cross-platform mobile application development approaches are Phone Gap [3], Titanium etc. The distinguish between approaches that employ a run-time environment and those that generate platform-specific apps from a common code base at compile time. The latter, generator-based category includes model driven solutions and cross-compiling. Up to now, there are no production-ready solutions of this category. Hence, till this types of approaches are concentrates on cross-platform solutions that combine the source code of an app with a runtime environment. Some of the examples of cross-platform application development tools are Phone Gap, which is a Hybrid framework and Titanium. The most prominent hybrid framework till date for cross platform application development is Phone Gap. Phone Gap was originally created by Nitobi Soft-ware, which has been acquired by Adobe. The development now takes place in the Apache Cordova project of the Apache Foundation, of which Phone Gap is a distribution. Phone Gap a very popular cross-platform mobile application development tool is loosely based on jQuery which is a very fast library conversion tool. This research paper helped to analyse how different tools which are currently available

in the market function and interact with each other.

Also the technologies on which cross-platform mobile application development tools which are currently available in the market are currently based on some of these technologies which are currently very popular are HTML5, Javascript and open source libraries such as jQuery[7] and jQtouch[6]. Thus developers can use a great part of their skills to develop mobile applications. Mobile-web applications are applications which use an instance of mobile web browser to run the application. These are suited for mobile websites like m.yahoo.com, m.facebook.com. These applications are developed using cross-platform SDK's and open source libraries such as jQuery, jQtouch, etc. The user interface (UI) is developed in HTML5 and logic is defined by JavaScript. The final deliverable is a set of files that can be hosted on a web server and the application can be accessed using any web browser which could be from a PC, Android device, iOS device or a Blackberry device. Hybrid mobile applications are a combination of the previous two application types. These applications are developed using open source libraries but also have access to some of the native capabilities of a device such as Camera, GPS etc. So in simple words, cross-platform mobile development by taking example of HTML5 based web application which can be accessed from any sort of Mobile Browser.

Also one of the way to implementing the code converter by developing an online examination application in it. It is basically developing an application regarding to examination system which will reduce time of evaluation and hence give the results in seconds. This response system can be used for any subject of any given course. Each student will be given a pass key as unique identity for a particular paper. Also the results can be viewed by the students and also the concerned professor. Their main aim is to develop and design an application which works both on Android as well as iPhone or iOS, they would help both teachers as well as students while giving test. Their project which they developed is basically divided into four parts which are application development, translator, iOS and Android. Basically their application will be either developed on Android or iOS and will be sent to the translator along with translation details whether the application will be deployed on Android or iOS. Basically, the application development here is done in JAVA. The translator will check if the translation details are for Android or iPhone. It will refer to Objective C library if translation to be done is for iPhone. If it is to be done for Android it will refer Java library translated code will be

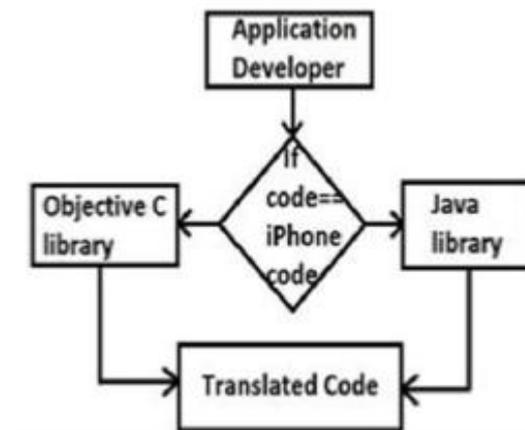


Fig. 1. Figure 1: For the System[1].

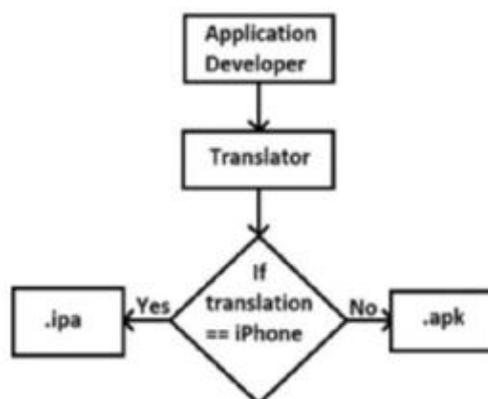


Fig. 2. Figure 2: For the translator[1].

Sent to respective platforms. After the translation of the code is done the translated app will be received either by the Android phone or the iPhone. The authors have divided the entire research paper into two divisions. They are :

A. For the System

B. For the Translator.

C: Mathematical Model: Let us consider S as our proposed system, The system S can be represented as $S=I,F,T,O$

I = Input

F = Functions responsible for conversion of source code T= Translator

O= Output

A. Input these are basically JavaScript source code, which will be converted to respective platform.

$I = I_i/I$ is the code of online aptitude test in JavaScript Where i is $1_i=i_j=n$ represent various modules in the application like staff, student, admin.

B. Function

1. $F=L1,S$ source code is passed through libraries of Android to generate a respective android code.
2. $F=L2,S$ source code is passed through of IOS to generate a respective android code.

C. Translator $T=F$, Translator consists of respective function, which contains code conversion logics.

D. Output

$O=O_i/O$ is the executable of respective platform where i is $1_i=i_j=2$

1=Android(.apk)

2=IOS(.ipa)

So finally from this experiment a mathematical model was derived through which we are able to express our problem statement. This mathematical model might help us in the development of the cross-platform mobile development integrated development environment.

II. Advantages

There were some advantages found by reviewing different algorithm. In the first , we have discussed about the compatibility operating system architecture which was derived from CIDER, has the ability to simultaneously run Android and iOS applications at the same time on the same device. It helped us to achieve a difficult task of running unmodified iOS binaries on the Android subsystem. The performance measurement benchmarks also indicated that CIDER performed in a better way than the default Dalvik Compiler Machine. Dalvik Compiler Machine is a type of byte-code generation tool which compiles the application source code before the execution of an application. The CIDER compiler was found to be performing better than Dalvik.

And also the way to understand the various parameters through which we can distinguish between various cross-platform mobile application development tools which are currently available in the market some of these parameters were launch time, type of GUI, security performance etc. This research paper also helped us to understand how these cross-platform mobile application development tools perform and on what technologies they are based on.

One of the ways by providing a deep insight on the latest technologies on which cross-platform mobile application development tools . Some of these technologies were HTML5, jQuery , jQtouch, HTML5 and CSS are used to design web applications which are platform independent.

III. Inferences

In bold terms what was understood that it was about a operating system compatibility architecture namely CIDER[1]. Basically it built as a project by the students was regarding the native execution of iOS applications on the Android Platform. CIDER gave us two functionalities namely diplomatic functions and Duct-Tape mechanism. What these two functions do is that they mimic the kernel level thread behaviour of the iOS subsystem through which the execution of unmodified binaries was done on Android platform. Through

this Operating system compatibility architecture the students were able to run some iOS applications which were downloaded from the App Store and their respective binaries were extracted and were made to run on Novel compiler which basically made the code written in Objective-C portable and easy to run on Android Architecture.

Also facts could be inferred like about how through various parameters Cross-platform application development tools which are currently available in the market can be distinguished. Some of these parameters include Supported platforms, Access to platform-specific features etc. It was also found that Phone Gap which is a very popular cross-platform development tool was most preferred among all of the tools as it was based on the concept of jQuery which is a very fast library conversion tool. It helped to analyse how these cross-platform application development tools function but at a very superficial level as the developers don't share their source code due to copyright violations and to understand the technologies which are these days used to build cross-platform development tools like HTML5, CSS etc. This research paper concentrated on building of web-based applications which are platform-independent.

Also in a way explained the concept of cross-platform mobile application development IDE in terms of a mathematical model[15]. It also emphasized on the concept of fragmentation[16] of mobile operating systems.

IV. Conclusion & Future Scope

Comparison is done for cross platform environment. CIDER helped us to analyze the entire iOS and the Android ecosystem with which we could basically port some of the functionality of iOS platform on the Android subsystem. Also it help us to convert our research problem to a mathematical model through which could start working on the functionalities of our IDE.

Finally after concluding all review which were related to topic of Cross Platform Mobile Application Development, the concepts related to mobile operating systems and how these mobile operating system which seem to work very differently from each other are quite similar. So coming to the point, so it is propose after all these experiments is that we can build a integrated development environment something like Eclipse or Netbeans which will help us in achieving our aim. Basically in this IDE the developer will be given a choice to develop his application either in Java or Objective C. After he designs the GUI and works on the coding part and after that debugs and ensures his application is complete he would be given a choice to deploy his application to either iOS or Android. Basically our IDE will perform all the code conversions, semantically changes and logical changes required to deploy the application to a different platform. Our IDE will also feature a very sophisticated benchmarking or analysing tool which will help the developer to debug his program, check for memory leaks and do other stuff related to the testing part. This IDE will also be quite platform independent that is, there would be variants for Linux based systems and Macintosh based systems too.

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