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Transplantation of Native Android Apps onto J2ME Platform

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Abstract: ***Google's open-source Android mobile platform has been a powerful competitor of mobile operating system and drawn the attention of the leading manufacturers of the industry and became a hot spot of research. As it adopts the virtual machine Da lvik which is different from SUN Java and its Java application developing framework and its APIs are absolutely different from J2EE a number of mature Android applications cannot be applied on J2ME platform. Thus, the general resolution of transplanting Android applications onto J2ME platform not only protects the existing investment but also enriches the applications on Android platform. Currently there is no technology available that will convert an Android app into a J2ME app. If we want to make an Android application work on the J2ME platform, it can be done so by building an interactive converter system. The interactive mobile system can convert native Android apps into J2ME apps with the facility of transferring data between the two systems with an add-on feature such as data backup. The interactive system will facilitate the user to have a backup of the call logs, SMS logs, contacts and multimedia and/or text files on the server. Similarly, there can be inter-conversion between iOS, Blackberry and other apps.***

Keywords: Android, J2ME, Dalvik, JVM.

1. Introduction

The main objective is to convert android apps to J2ME apps. The source code of an android .apk app will be converted into a .jar file. There will be a provision for backing up all of the user's contacts, SMS and call logs onto a main server. There will also be a provision for backing up and restoring the various multimedia and/or text files that may be present on the user's mobile. The user data will be kept securely on the server using username and password authentication.

2. Android and J2ME Platforms

Android is a mobile operating system (OS) based on the Linux kernel and currently developed by Google. It uses a virtual machine Dalvik which is different from the Java Virtual Machine. Programs are commonly written in Java and compiled to bytecode for the Java virtual machine, which is then translated to Dalvik bytecode and stored in .dex (Dalvik EXecutable) and .odex (Optimized Dalvik EXecutable) files. Unlike Java VMs, which are stack machines, the Dalvik VM uses a register-based architecture that requires fewer, typically more complex virtual machine instructions. Dalvik programs are written in. Java using the Android application programming interface (API), compiled to Java bytecode, and converted to Dalvik instructions as necessary. A tool called dx is used to convert Java .class files into the .dex format. Multiple classes are included in a single .dex file. Duplicate strings and other constants used in multiple class files are included only once in the .dex output to conserve space. Java bytecode is also converted into an alternative instruction set used by the Dalvik VM. An uncompressed .dex file is typically a few percent smaller in size than a compressed Java archive (JAR) derived from the same .class files.

Java ME was formerly known as Java 2 Platform. Micro Edition (J2ME).Java Platform, Micro Edition, or Java ME, is a Java platform designed for embedded systems (mobile devices are one kind of such systems). Target devices range from industrial controls to mobile phones (especially feature phones) and set-top boxes. Java ME was designed by Sun Microsystems, acquired by Oracle Corporation in 2010. The platform replaced a similar technology, PersonalJava. Java ME devices implement a profile. The most common of these are the Mobile Information Device Profile aimed at mobile devices, such as cell phones, and the Personal Profile aimed at consumer products and embedded devices like set-top boxes and PDAs. Profiles are subsets of configurations, of which there are currently two: the Connected Limited Device Configuration (CLDC) and the Connected Device Configuration (CDC).

3. Conversion of Android Apps into J2ME Apps

3.1 System Architecture

The system architecture elaborates the conversion process from Android to J2ME platform in brief.

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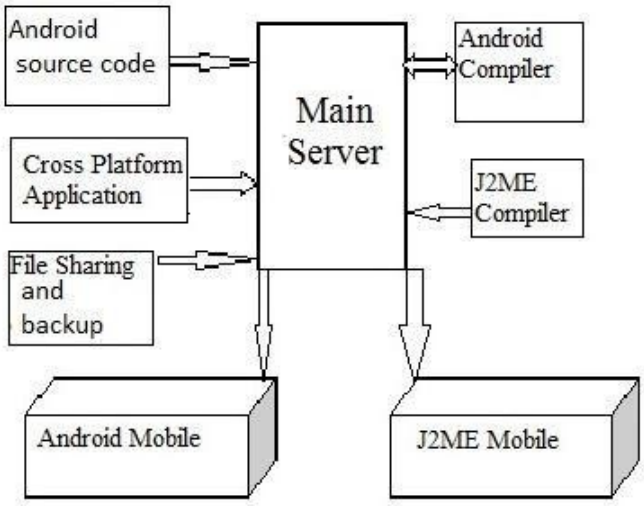

Figure 1: System Architecture

3.2 Algorithm used for Conversion

The algorithm is as follows:

Step 1: Upload apk source code file.

Step 2: Tokenize it and store appropriate contents in symbol table and literal table.

Step 3: Now suppose we encounter a statement like System. out. println, then a parse tree for it will be generated and an equivalent tree in android java will be created for this tree.

For example, consider the following two equivalent trees for the statement System.out.println:

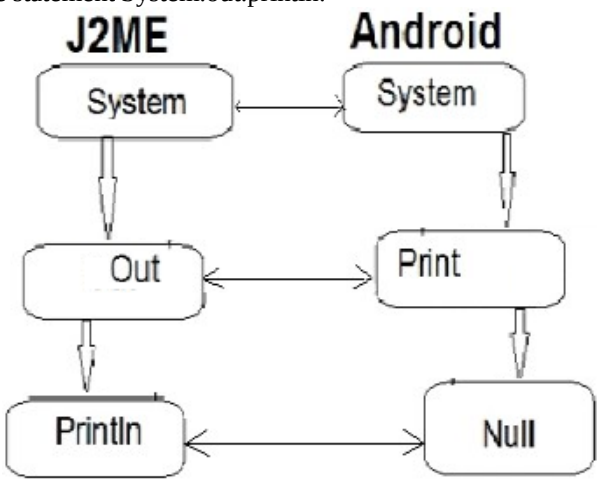

Figure 2: Mapping Algorithm

Step 4: We shall be using top down parsing technique.

Step 5: The generated equivalent parse tree can be converted to a CFG which can in turn be compiled into a .apk file using an android compiler.

Step 6: Also techniques like method mapping, object mapping, etc. will be needed to be performed. For example, User interfaces in J2ME are created using java forms, whereas in android java, we use XML files for this purpose. Elements are nested in the XML file exactly as they will be nested in the object hierarchy. This is a very convenient and natural way to construct a user interface.

4. The Interactive System

The interactive mobile system can convert native Android apps into J2ME apps with the facility of transferring data between the two systems with an add-on feature such as data backup. The interactive system will facilitate the user to have a backup of the call logs, SMS logs, contacts and multimedia and/or text files on the server. Similarly, there can be inter- conversion between iOS, Blackberry and other apps. The system features are as follows -

1. Create an account:
New user should first create account to get access to system. User can create new account through login form provided in application.

2. Login:
After creating account user can login into system with unique user id and password. User can access application only after authentication process completed.

3. Backup Data:
User can backup contacts, sms logs. If user selects contacts to backup then all contacts from phone memory will be copied to the local disk under specific directory.

4. Restore Data:
Backup data of each user is stored on local disk under separate directory with user id name. When user wish to restore data from local disk, server will identify directory with that particular user id and will restore data.

5. Convert Data:
It is conversion of the Android Application into the J2ME Application. Cross Platform is the bridge between J2ME and Android.

6. Sharing Data:
File is stored on server under separate directory with user id, Password. When user wish to share file from server, server will identify directory with that particular user id and will share file.

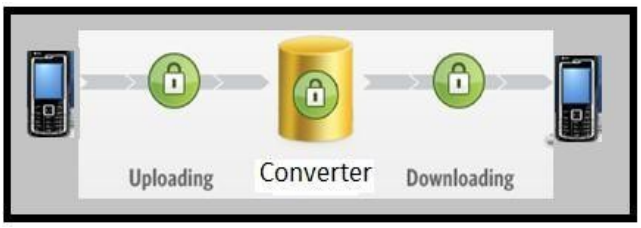

Figure 3: Data Converting, Uploading and Downloading.

5. Future Scope

5.1 J2ME to Blackberry Conversion

J2ME apps can be deployed on all multiple platforms and devices. Many smart phone manufacturers therefore endorse this J2ME development. Moreover, the security and the visual appeal of the applications are also the USPs of J2ME

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apps. Currently so many smart phone manufacturers support J2ME apps and even BlackBerry smart phones have become J2ME compatible. BlackBerry has been one of the market leaders with a strong customer base. BlackBerry has its own Java Virtual Machine and also comes with additional APIs. And with this smart phone supporting J2ME, users can expect more entertainment and utility applications. There are numerous third party application developers that offer conversion of J2ME to Blackberry. The dashboards in smart phones function as control panels and enable the users to manage and access the applications.

5.2 J2ME Apps for iPhone

Some development companies are pushing to make a translation program to convert J2ME code to the equivalent code for the iPhone. But Steve Jobs had a problem with Java. He has effectively killed Java applications from the Max OS X as well as the iPhone and iPad .Java may have stability issues on the Mac OS. Java originally developed by Sun Microsystems was purchased by Oracle. The last deployment of Java was on the Leopard Mac OS X 10.6.6 but Lion OS X 10.7 will be out in the summer 2011, and it does not have Java. More recently, Jobs explained his position this way, “Sun (now Oracle) supplies Java for all other platforms. “It simply isn't true that 'Sun (now Oracle) supplies Java for all other platforms. IBM supplies Java for IBM's platforms.

6. Conclusion

Thus, by creating a medium of converting android based apps efficiently working on symbian phones, we can have platform independent apps. File sharing and retrieval can be more efficient. Also there is no need of purchasing expensive mobile systems.

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