

Advanced platform for Android Application Development

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Abstract- Now a day's Android becomes one of the fastest developing and widely preferable operating system mostly useful for mobile devices such as smartphones and tablets. This development is possible mainly with its best quality that is open source in nature. Android is based on the one of the most secure operating system i.e. Linux. Google take the Open Handset Alliance on which Android was developed by the third parties also. This paper is based on how Android operating system and their applications are developed. This paper gives you both basic idea about Android programming and its development and also some advance concepts related to Android application development that can be provided by the Third party. We study about how Android Development is done using the tools like Android Software Development Kit (SDK), and other development environments like Native library, Debug Bridge and accessories kit and some third party provider tool by which new applications are created for Android and with the combination of this it is developing continuously.

Keywords: *Android Operating System, Software development kit (SDK), Android Debug Bridge (ADB), Kivy, Hyper Next, AndroWish.*

I. INTRODUCTION

Android operating system is the mobile Operating System that enhancing its use in different areas of today's life. Android operating system is developed by Google on the basis of the Linux kernel and firstly designed and used for smartphones and tablets [1]. Android is designed primarily for touchscreen mobile devices such as smartphones and tablets so increasing interest of many developer to create new application for it. The OS uses touch inputs that loosely correspond to real-world actions for manipulate on-screen objects, and a virtual keyboard are supported by many third party development tools. Despite being primarily designed for touchscreen input, it also has been used in game consoles, digital cameras, regular PCs and Computers and other electronics.

Android's source code is released by Google under open source licenses which Sims as like most important quality for increasing development and acceptance, although most Android devices ultimately ship with a combination of open source and proprietary software develop [2]. Android was unveiled in 2007 along with the founding of the Open Handset Alliance—a consortium of hardware, software, and telecommunication companies devoted to advancing open standards for mobile devices [3].

Since 2008, Android has seen large amount of updates as they are develop by many users which have incrementally improved the operating system, adding new features and fixing bugs in previous releases. Each major release is named in alphabetical order after a dessert or sugary treat; for example, version 1.5 *Cupcake* was followed by 1.6 *Donut*. Version 4.4.4 *KitKat* appeared as a security-only update; it was released on June 19, 2014, shortly after 4.4.3 was released [4] [5]. As of November 2014, the newest

version of the Android operating system, Android 5.0 "Lollipop", is available for selected devices [6].

As the need and demand are grows on increasing, there are lots of Developer interested in developing Android mainly because of its features like, it is a free and open source mobile platform, based on a Linux-based, multiprocessor, multithreaded OS. Android is not a device or a product, it's not even limited to phones - you could build a DVR, a handheld GPS, an MP3 player, etc. [7]. Android gives developers a way to develop unique, creative applications and get those applications in the hands of customers. There are Hundreds and thousands of Android mobile phone users are already there, looking for the next clever or useful application. In this paper, we are giving the main development platforms that are given by Android official development as Software development kit (SDK) for actually creating or developing software, Android Debug Bridge (ADB) for providing connectivity between client and server applications [8]. Native Development Kit (NDK) making native code for building native applications. Along with this we have mention some of the Third party supported platform for developing applications for android. Some of this are Kivy, Hyper Next, Andrews, etc. most of which are interested for smart mobile android applications. Finally, we conclude the paper.

II. DEVELOPMENT TOOLS PROVIDED BY ANDROID

A. Software development kit (SDK)

As the name given software Development Kit (SDK) mainly support for the software's applications for a certain software package, framework and hardware platform for operating systems [10]. It provides us some tools like application programming interfaces (APIs) for developing

application that can be interfaced to any particular programming language[9]. In the case of embedded application development SDK provides sophisticated hardware and some tools for debugging and using utilities that work in an integrated development environment (IDE). The tools and utilities that are provided by Android's SDK are the main attraction for the wide range of development of the Android.

The Android software development kit (SDK) includes a comprehensive set of development tools [11]. The main attraction is towards a following tools:

Debugger -that is used to test and debug mainly the "target" programs, commonly now seen in integrated development environments.

Libraries -A collection of non-volatile resources used by computer programs to software's. Android have a standard library and programmers can also create their own custom libraries. As like most other development Android library includes configuration data, documentation, help data, pre-written code and subroutines, classes, values or type specifications, etc.

QEMU (Quick Emulator) - An emulator typically enables the host computer system to run software or use peripheral devices designed for the guest system. QEMU called as Quick Emulator is a free and open-source hosted hypervisor that performs hardware virtualization. It also can be used together with KVM (Kernel Virtual Machine) in order to run virtual machines at near-native speed. As Android is mainly used with mobile devices, Emulator provides potentially better graphics quality than original hardware, and gives additional features than original hardware, it save states, allow users to play games for discontinued consoles.

B. Accessory Development Kit (ADK)

The Android's open source nature also support its users and interested developer to build their own new accessories that can be treat as alternative hardware based on the ADK [13]. The Android's Accessory Development Kit (ADK) provides references, source code and hardware specifications for implementation of hardware and for their manufacturer's also. For actually implementing the users developed Android relies on a suite of standard protocols that is helpful for any developer to make their accessories to be compatible with a wide range of Android-powered devices all around.

There are different types of hardware accessories that android support are audio over a wired 3.5 mm headset jack, USB connection, or Bluetooth. Android also required to supports Custom Accessories based on the devices which one can connect to any Android powered devices like Alarm clock, Keyboard, Thermostat, etc. Along with this once can also connect many personal use device accessories to the Android like audio docking stations, exercise machines, mobile health monitoring devices, weather reporting devices, etc. that adding functionality to the Android.

For connecting Android Accessories, it support the use of Android Open Accessory (AOA) protocol to communicate with Android devices, over a USB cable or through a Bluetooth connection. It is very much important to

learn how to implement Android Open Accuracies Protocol firstly for any ADK developer, once its learn by any developer he gets freedom to It is mainly support. Android Open Accessory protocol. By learning how to use ADK, and implementation of AOA one can get started building their own accessories for Android[12]. By learning how to connect existing equipment or your own unique hardware to Android using the Android Open Accessory Protocol user can attach any hardware to any Android powered devices.

C. Android Debug Bridge (ADB)

ADB stands for Android Debug Bridge [14], jointly coming with SDK, which is a set of tools use by Android developers to use for many hardware and software jointly work with Android. Android Debug Bridge (ADB) is act as a tool that helps you manage the state of an emulator instance running command-shell or Android-powered devices and allowing the user to send commands to their Android device from PC also.

As the name suggest bridge so it actually should be act as communicator between two end users or two application developer. In the standard computing language, it is called a client-server programming that includes three components [15]:Firstly, A Client which is running on the development machine or it can be called by other Android tools as the ADT plugin and DDMS also create ADB clients. The second main comment, Server manages communication between the client and the ADB daemon running on an emulator or device. The third devices is a Daemon, which runs as a background process and managing all the devices and their background functioning.

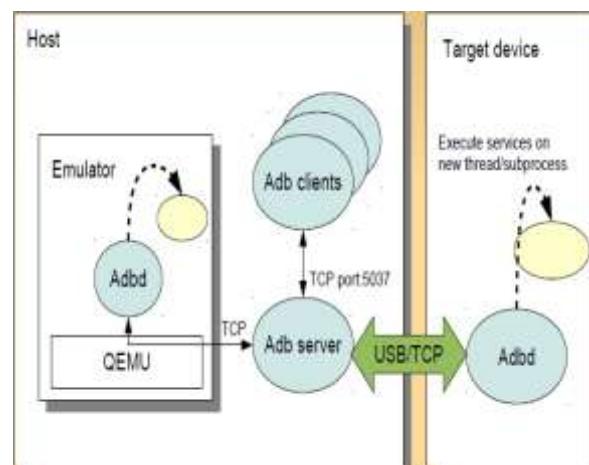


Fig. 1: Overview of ADB working

D. Native Development Kit (NDK)

As in many basic languages like C, C++, Android also support sand make use of its NDK. Using the toolset provided by NDK allows the developer to implement parts of your app and one can reuse existing code libraries that are written in the languages such as C and C++. The NDK also supports for the development of most of the Application using Android [16]and can be integrated with native code with Java code also. The code which is developed using

Native libraries in Android is graphically and computationally intensive, and has little interaction between Java application code and native code.

As in many basic languages, the Android NDK should be used primarily for building native libraries can be called as shared objects used in creating Android applications. Earlier most of the Android applications are build using java code. With the success of building NDK for Android, It becomes possible to develop Entire applications without using Java code. The first Android OS is Android 2.3, Gingerbread based completely on Native Activity of Android [17]. Some Typical good applications for the NDK are game engines, signal processing, physics simulation, and so on growing widely from here. By examining Android framework, its APIs provide the functionality that one is needed which is possible to develop in native code by examining its requirements.

III. OTHER DEVELOPMENT SUPPORTERS

A. AndroWish

AndroWish is an on-device Tcl(Tool Command Language) /Tk (GUI toolkit) interpreter [18]. From which. Tcl- is a dynamic programming language which is very powerful suitable for networking, administration, testing and many more. It is also very easy I learn suitable for developing web and desktop applications, Open source and business-friendly, Tcl is a cross platform language that can easily be deployed and possible to extend easily according to requirement.

Tk- is a toolkit mostly supported for graphical user interfaces that makes it easy to develop desktop and web applications to a higher level than the original conventional approaches. This GUI toolkit is support not only for Tcl, but also for many other dynamic languages, for producing rich, native applications that are platform independent for Windows, Mac OS X, Linux and more also.

The Andro wish provides support for multi-windows GUI, give access to Bluetooth, USB, network sockets, text-to-speech, speech recognition, sensor, GPS tracer or network information), SQLite , etc. all of this functions are most important for mobile users and developer to embedded in their devices. The command in the tcl integrates the capabilities of Tcl/Tk with Android OS by using several subcommands, possibly provide querying and controlling Bluetooth functionality, OS notifications location information, etc. which is not possible earlier.

B. HyperNext Studio

As given in the earlier section they are officially provided development tool supported for any interested android developer to develop application for Android. The another utility given by third party used by and provides support for any hobbyists developer, students, educators, to start building their own software that works is the Hyper Next. This serves as tools that can be used to develop amazing android applications by anyone, even without the knowledge of Java or the Android SDK and they are also called as Hyper Next Android Creator (HAC) [19].

One important thing that makes it easy for any beginner to developed application for Android is its simplicity. This tool is available in English format syntax and provides a visual designer for laying out screens. The graphical user interface that it provides for visualizing, for creating and uploading them onto an Android Emulator or Android device via wireless networking technology. The software application developed for android are free to download and use, providing it more interest for developing application for Android and HAC gives amazing support for different devices.

Hyper Next is also work as programming language which easy-to-use, user-friendly software for learn and implement, takes software as a heap of cards making it more suitable for new user to develop application for Android using this language. As not the standard set is used for developing java native applications hence new developer always face challenges associated with Java standards. This issue provides tools that have been developed which has help in Android conversion activities. There are three modes in the Hyper-Next as: Design, Preview and Run [20]. Two widely used IDEs that is Eclipse and Net beans are use in HAC. It is a by itself work as software application basically used for designing android applications much easily. Hyper Next is a programming language have some unique and easy to understand features that are:

- Simple English-like statements.
- Variables are either Global or Local, type-less and can be stored as strings (text).
- Created with the Standard Edition of HelpNDoc: and easily create HTML Help documents, containing help for building to any user.
- Each control can have many local procedures and can be embedded in the programs mini code.
- It support many specific commands for numeric and string processing.
- It support variables that can be of single line, multi-line or array-like in type.
- You can get Runtime error reporting. But if you needed it can be dynamically switched on or off.

C. Kivy

As Android is mainly used for smart phone Operating System it is supported by a development environment Kivy [21]. It is based on Python language, The Kivy is acting as an Open source Python library for rapid development of applications making use of innovative user interfaces, multi-touch apps, etc. You can run Kivy applications on Android, on any device with OpenGL ES 2.0. This is standard on modern devices.

Kivy APKs are normally Android apps that can be distributed like any other application work on any distributed platform. This work seemly as like application that are included on Mobile stores like the Play store. The applications are work properly as like installation and make it reboot or after paused or restarted [21]. Kivy application may utilize Android services. They have support for access to most of the normal java API used for building application easily.

D. Basic4android

One another rapid application development tool that act as an alternative to programming with Java and the Android SDK and mostly used for native applications development is Basic4android and is abbreviated as B4A. It is, developed and marketed by company named Anywhere Software Ltd. [23] B4A supports development of the users interface mostly used for developing user designer interface which support different screen sizes. This makes use of Android Debug Bridge and B4A Bridge for testing Compiled programs [24] Basic4android language is an object oriented and event driven language and sometimes similar to VB or VE .net. One of the important and interesting thing to note here about B4A is it supports all types of applications, databases, connectivity, sensors and hardware devices making it interesting to use for all platform development. B4A generated Android applications can be directly uploaded to app stores supported by different companies like Google, Samsung and Amazon, without requiring any special or runtime frameworks.

IV. CONCLUSION

As normally, large amount of people worldwide are using Smartphones based on the Android Operating System. This makes Android Operating System an emerging as a new mobile development platform for mobile software's and software supporting hardware's devices. As the development has evolved over time, Android was designed to empower the developer to write innovative applications and their own source code. The main reason behind this is the Open Source nature taken by main developer of Android, it takes no up-front fees, with which developers enjoy many benefits over other competing platforms. In this paper we learned about the various development tools provided by Android officially including Software development kit (SDK), Accessory Development Kit (ADK), Native Development Kit (NDK), Android Debug Bridge (ADB), etc. As Android is catching the interest of many developers, there are some of the third parties trying to develop their own code for Android Development. Some of the third party application that we mention here are Androwish, Hyper Next, Kivy, etc. supporting development of many software applications and some of the embedded application as hardware should be work with software with our mobile devices. By using these various different tools the Android developer can learn and build applications and Android as more and more platform developing Operating System in different fields of modern technology.

REFERENCES

- [1] Android Operating System [Online] available: http://en.wikipedia.org/wiki/Android_%28operating_system%29.
- [2] "Google's iron grip on Android: Controlling open source by any means necessary". *ArsTechnica*. Retrieved December 8, 2013.
- [3] "Industry Leaders Announce Open Platform for Mobile Devices" (Press release). Open Handset Alliance. November 5, 2007. Retrieved February 17, 2012.
- [4] "Google details Android 4.4 KitKat, its latest mobile upgrade". Techradar.com. October 31, 2013. Retrieved November 5, 2013.
- [5] "KitKat mocks Apple with Android 4.4 parody video". *The Verge*. Retrieved September 4, 2013.
- [6] Danny Choi (November 14, 2014). "Android 5.0 Release Date: Lollipop for Samsung Galaxy Available By January 2015". Latin Times. Retrieved November 15, 2014.
- [7] Paul, Ryan "Developing apps for Google Android: it's a mixed bag". *ArsTechnica*. Archived from the original on December 20, 2007. Retrieved December 19, 2007.
- [8] Mark L. Murphy, "The busy Coder's Guide to Advanced Android Development," [Online] available: http://commonsware.com/AdvAndroid/AdvAndroid-1_0-CC.pdf
- [9] "Other SDK Releases". *Android Developers*. Retrieved September 2, 2009.
- [10] "SDK Tools | Android Developers". *Developer.android.com*. Retrieved November 8, 2014.
- [11] "Tools Overview". *Android Developers*. July 21, 2009.
- [12] "Intelligent Android Development". Retrieved September 19, 2012, [Online] available: IntelliJ Android Development.
- [13] Accessory Development Kit (ADK), [Online] available: <http://developer.android.com/tools/adk/index.html>.
- [14] Justin Dennis , "New To Android Debug Bridge? How To Make The Process Simple And Easy," On 12th January, 2015.
- [15] Android Debug Bridge [Online] available: https://events.linuxfoundation.org/images/stories/pdf/lf_abs12_kobayashi.pdf.
- [16] Native Development Kit, [Online] available: <http://developer.android.com/tools/sdk/ndk/index.html>.

[17] Android_NDK [Online] available:
http://www.indigoo.com/dox/mobdev/01_Android/Android-NDK.pdf

[18] "AndroWish". tcl.tk. June 21, 2014. Retrieved July 3, 2014.

[19] HyperNext Studio freeware [Online] available:<http://www.tigabyte.com/index.html>.

[20] Android Developer India [Online] available:
<https://sites.google.com/site/androidappdevsindia/what-you-should-know-about-hypernext-android-creator-hac>.

[21]<http://kivy.org/#home>

[22] Programming Guide » Kivy on Android [Online] available: <http://kivy.org/docs/guide/android.html>.

[23] Bridgwater, Adrian (2011-02-16). "Anywhere Software Launches Basic4Android | Dr Dobb's". Drdobbs.com. Retrieved 2013-08-21.

[24] Darien Graham-Smith (February 2013). "Write Your Own Android App with Basic for Android - Part I" (PDF). PC PRO Magazine.