

Overview of Android for User Applications

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Abstract- This paper presents the requirements to develop the applications on the Android Operating System. Mobiles are the hot cakes in now-a-days market. Features of mobile depend on software. As mobiles are the low-powered devices that uses battery to run and it is a rechargeable one, so the operating system for mobiles has played a crucial role. Necessity for developing applications that could run on mobiles increases at current days. In order to fulfill that features Google introduced Android. Dalvik Virtual Machine facilitates run time environment. Android components are necessary to develop the applications. Android operating system first developed by Google later Open Handset Alliance. Android Operating system provides flexible environment for writing applications in java language. This operating system is free, robust and user friendly.

Keywords- Android Operating System, Open Handset Alliance, Dalvik Virtual Machine, Android components

I. INTRODUCTION

As there are tremendous changes taking place in size ranging from desktops, personal computers, mobiles, tablets and smartphones[1]. One of the reasons for these changes is due to the operating system compatibility and flexibility. Hence Operating system plays a vital role as it acts like interface between user and hardware [2]. There are several operating systems such as LINUX, UNIX and WINDOWS [3]. The word android came into existence after 2005 due to mobile devices. Now-a-days phones become the essential part of people as it is providing the people's communication. All features that we encounter in desktops, laptops, the same can see in mobiles as a result it plays an exhaustive role in the market.

Android is a common source operating system. Android operating system can run on any mobile device based on LINUX Kernel 2.6 introduced by Google. Later changes taken place in Android operating system was developed by Open Handset Alliance (OHA) [4]. Android is a collection of software stack, middleware and some key applications. Android gets fame as a result of providing more opportunities to developer in order to have their extensions or modifications. Android history starts from the year 2005. At first Google buys Android Inc. later in 2007, Open Handset Alliance developed the Android operating system and released Android SDK 1.0 version in 2008. After 2008 many versions of Android came into existence [5].

II. SYSTEM ARCHITECTURE

Linux kernel supports many architectures. Android supports X86 architecture and ARM [6]. Android architecture is a layered architecture. Linux Kernel acts as a Hardware Abstraction Layer (HAL). Each and every android application contains its own processing environment. Architecture of Android mainly consists of application layer, application framework layer, library, runtime and kernel layer which are shown in the below **Figure 1** [7].

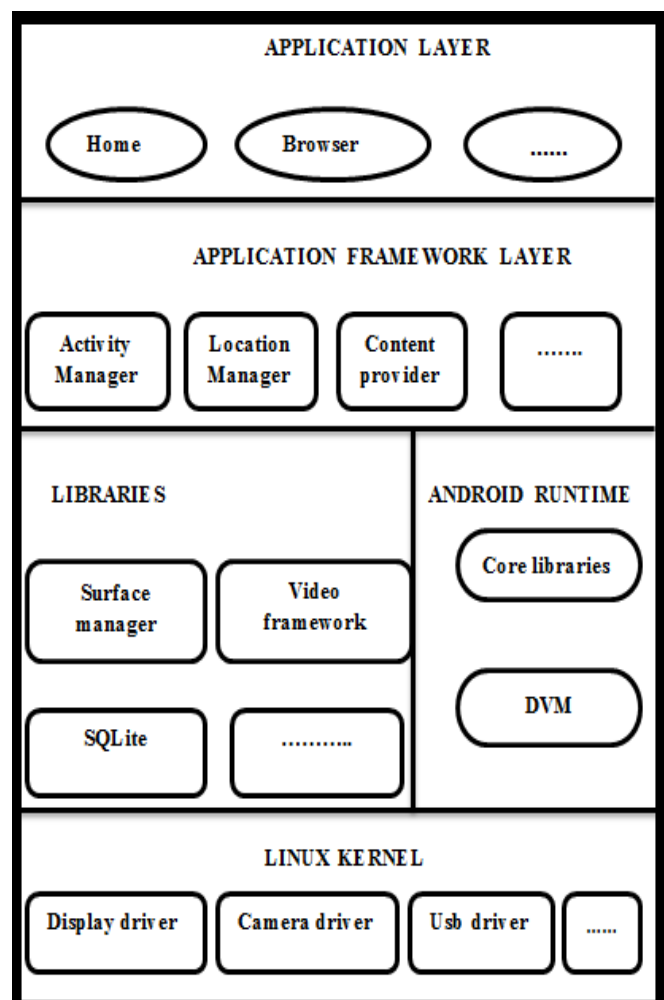


Figure 1

1. APPLICATION LAYER:

Application Layer mainly consists of applications. These applications were developed by manufacturers or user downloaded applications. These application uses java

programming languages. For example browser, contacts and phone etc. Home displays the opening page of the phone whereas Browser is used for extracting, presenting and transferring the data. Calendar is used for viewing the dates as well as other applications such as email, whatsapp.

In order to build the android application, the topmost layer called Application Layer contains application components which are listed below [11].

- Activity
- Service
- Broadcast Receiver
- Content provider

Activity: Activity is the purpose of User Interaction (UI). A visible screen in application where an application is seen called an activity. By using this component User can interact with application. The first writing class in the any of application should be extends from **Activity** class.

An activity represents a single screen with a user interface. For example, an email application might have one activity that shows a list of new emails, another activity to compose an email, and another activity for reading emails. If an application has more than one activity, then one of them should be marked as the activity that is presented when the application is launched.

Another example, an prescription application where user saw the list of medicines is one activity, reads the medicines is another activity, asking question to doctor is another activity. So the whole application treated as one activity and is written like this. This can be written as class Myprescription extends Activity

Service: Service is component which runs on background and this component can't provide UI. If application needs background process then it has to use this component. For Music player as the user is in another application user can also do some other task such as playing games. Another example, when the user is in one application user can also fetches the data over the network.

Broadcast Receiver: Broadcast receiver is the component which provides System and app level intents to the application. It will trigger once when it get any intents. When an application is downloaded it sends a notification as when the application is downloaded.

Content provider: Content providers are an app component. By using this, one can access data from other application or within application. Content provider transfers data from one application to another application. Data is stored in database. When user is sending a message, contact number is retrieving from contacts application.

2. APPLICATION FRAME WORK LAYER:

This layer has all available resources, which is provided by operating system. It mainly provides the framework needed to run the uppermost layer called Application Layer.

Activity Manager manages the activity life cycle of applications.

Suppose to find the current location of device, location manager framework is required. It provides necessary information of the location.

Content Provider manages the data sharing between applications. Other frameworks such as Resource Manager which manages the various types of resources that helps in developing Application and Notification manager, Telephony manager etc.

Third layer consists of Libraries and Android Runtime.

3. LIBRARIES:

To support and execute applications or framework libraries are needed. This layer contains all libraries like SQLite DB, OPENGL, SSL and etc.

Lib c: c standard lib.

SSL: Secure Socket Layer

SGL: 2D image engine

Open GLES: 3D image engine

SQLite: Embedded database

Web Kit: Kernel of web browser

Free Type: Bitmap and Vector

Media Framework: Android Multimedia Core part

Surface Manager: Manage different Windows different applications

ANDROID RUNTIME:

Every Android application runs in its own process, with its own instance of the Dalvik virtual machine. Dalvik has been written so that a device can run multiple Virtual Machines efficiently. The Dalvik Virtual Machine executes files in the Dalvik Executable (.dex) format which is optimized for minimal memory. It also Provide the functionality of the JAVA Programming Language. The Android runtime also provides a set of core libraries which enable Android application developers to write Android applications using standard Java programming language.

Core libraries: Some of the core libraries provided by android android.app Provides access to the application model and is the major of all Android applications.

android.content:

It provides access of content, publishing and messaging between applications and application components.

Dalvik Virtual Machine (DVM):

DVM stands for Dalvik Virtual Machine. DVM is similar to Java Virtual Machine. It provides runtime environment to an android application [8].

4. LINUX KERNEL:

Android relies on Linux version 2.6 for core system services such as security, memory management, process management, network stack, and driver model. The kernel also acts as an abstraction layer between the hardware and the rest of the software stack [9]. Based on Linux version 2.6, the kernel provides multitasking, core system services such as memory, process and power management in addition to providing a network stack and device drivers for hardware such as the device display, Wi-Fi and audio.

Android Usb driver is needed the driver only if user and want to connect a Google Android-powered device. Android's camera HAL connects the higher level camera framework APIs in `android.hardware` to your underlying camera driver and hardware. Display driver provides the interaction between user level and the kernel level. Display driver provides the interaction between user level and the kernel level. Other drivers such as power management, keypad driver, shared memory driver.

Languages used for the Application Layer is the java. Even in Application Framework language used by this layer is java. Libraries, Kernel uses C and C++ for their development.

III FEATURES AND VERSIONS OF ANDROID OPERATING SYSTEM

Features: The following are the some of the features discussed below:

User Interaction:

Android OS provides beautiful, attractive and comfortable user interaction

Smartphone Layout:

A lightweight relational database so called SQLite is used for the purpose of storing the data in databases.

Connectivity:

Android supports different connectivity technologies like Bluetooth, Wi-Fi, and Wi Max.

Messaging:

SMS, MMS and android cloud to device messaging framework are available in android operating system.

Web browser:

Browser present in android operating system depends on web kit in mix with Chrome's V8 JavaScript engine supporting

Java support:

Most of the android applications are written in java language but there is an absence of java virtual machine in the platform instead of that DVM is presented. DVM is specially designed for android and battery powered mobiles.

Multitasking:

Android supports multi-tasking, which provides flexibility of running from one application to another or running different applications simultaneously.

Multi touch:

Android has a native support for multi touch which was first developed in HTC Hero.

Hardware Support:

Android supports video or still cameras, touchscreens, GPS, accelerometers, gyroscopes, magnetometers, proximity and pressure sensors, thermometers,

GCM (Google Cloud Messaging):

Google cloud messaging is service that allows one user to send short message service directly to other users on android devices.

Bluetooth:

Supports sending file, accessing the phonebook, voice dialing and sending contacts between phones. Keyboard, mouse and joystick support is available

Various versions of android operating systems are listed below along with their versions logo [10].

Alpha
Android 1.0



Beta
Android 1.1



Cupcake
Android 1.5



Donut
Android 1.6



Éclair
Android 2.0
Android 2.1

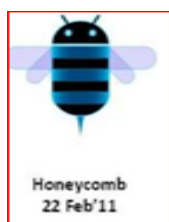
Android 2.2



Gingerbread
Android 2.3



Honeycomb
Android 3.0
Android 3.1
Android 3.2



Kit Kat
Android 4.4



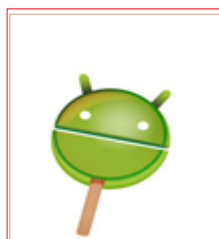
Ice Cream Sandwich
Android 4.0



Jelly Bean
Android 4.1
Android 4.2
Android 4.3



Lolip
Android 5.0



IV CONCLUSION

Due to rapid changes that are taking place in the mobile market, Android brought a drastic change in today's environment. Android Operating System mainly provides the user required technology that is utilization of mobile phones like a computer with storage, capacity and battery. This paper presents the architecture of the Android operating system and also discussed its features and the versions which are used to develop the applications.

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