Literature Review on Android Application Developed on Eclipse Software

Poonam Bedarkar
Department of Electronics Engineering
Kavi Kulguru Institute of Technology and Science
Ramtek, Dist: Nagpur , India
poonam11pune@gmail.com

Hemlata Meharkure
Department of Electronics Engineering
Kavi Kulguru Institute of Technology and Science
Ramtek, Dist: Nagpur, India
hemalanje@gmail.com

Abstract— This paper describes development of application on Android mobile platform. Windows Mobile and Apple’s iPhone now provide simplified development environment for mobile applications. Mobile applications give users a rich and fast user experience. This paper focuses primarily on the Android architecture which is based on Linux version 2.6. It is an open-source mobile phone operating system which is Linux-based. Android applications are written in Java programming language. Android SDK provides set of application programming interfaces (APIs) and Eclipse Platform that can be used to create applications.

Keywords- *Android, application framework, Android SDK, Eclipse software*

____*****____

I. INTRODUCTION

Now is an exciting time for mobile developers. Android also offers an equal alternative. Android [2] is an open source architecture that includes the operating system, middleware, and its key applications along with a set of API libraries for writing mobile applications that can shape the look, feel, and function of mobile handsets. Mobile developers can now expand into the Android platform to enhance existing products. Without any artificial barriers, Android developers write applications that take full advantage of increasingly powerful mobile hardware. Mobile applications are a rapidly growing segment of the global mobile market. In this paper, we discuss on Android mobile platform for the mobile application development, layered approach for android. Google released Android which is an open-source mobile phone operating system which is Linux-based. Android becomes the most widely used OS on mobile phones.

Android [1] is mobile operating systems designed for increasingly powerful mobile hardware. Windows Mobile and Apple’s iPhone provide simplified development environment for mobile applications. Android is built on proprietary operating systems that often prioritize applications those are created by third parties and restrict communication among applications and native phone data. Android offers possibilities for mobile applications by offering an open development environment built on an open source Linux kernel. Hardware access is available through a series of API libraries, and application interaction.

Android Mobile Application Development is based on Java language codes. It allows developers to write codes in the Java language. These codes can control mobile devices via Google-enabled Java libraries. It provides the platform to develop mobile applications using the software stack provided in the Google Android SDK. Android mobile OS provides a flexible environment for Android Mobile Application Development as the developers can not only make use of Android Java Libraries but it is also possible to use Java IDEs. The software developer in Mobile Development has expertise in developing applications based on Android Java Libraries and other important tools. Android Mobile Application Development can be used to create innovative applications. Mobile Development has worked extensively on projects gaming software, organizers, media players, picture editors devices and more.

II. BACKGROUND

Android is an operating system (OS) developed by the Open Handset Alliance (OHA). The Alliance is a coalition of more than 50 mobile technology companies ranging from handset manufactures and service providers to semiconductor manufacturers and software developers, including Acer, ARM, Google, eBay, HTC, Intel, LG Electronics, Qualcomm, Sprint, and T-Mobile. The stated goal of the OHA is to "accelerate innovation in mobile and offer consumers a richer, less expensive and better mobile experience" The java platform and the SDK tools were available in October 2008. There is single mobile phone that runs the Android OS which was G1 from T Mobile. According to the Android website the platform is based into the four core features as shown in the Fig 1:

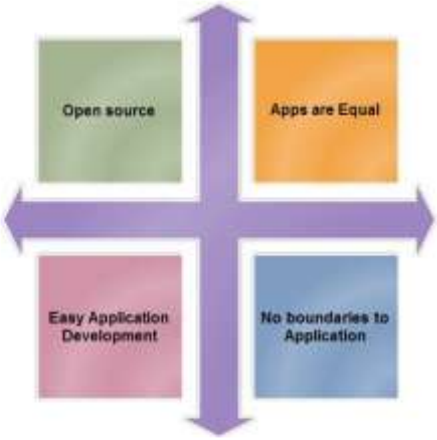


Fig. 1 Four core features of the android platform

A. Platform overview

Android is a software stack which is for only mobile devices. It includes an operating system, key applications. The Android SDK provides the tools. APIs necessary to begin developing applications on the Android platform using the Java programming language [3]. Android based on Linux version 2.6. The system services such as security, memory management, process management are controlled by Linux. Fig 2 shows android architecture.

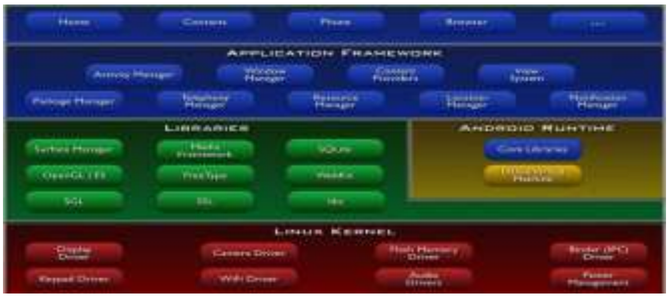


Fig. 2 Architecture of android [1]

B. Fundamentals

Android applications are written in Java programming language. They are not executed using the standard Java Virtual Machine (JVM).[6] Google has created a custom VM called Dalvik which is responsible for converting and executing Java byte code. All custom Java classes must be converted into a Dalvik compatible instruction set before being executed into an Android operating system. Dalvik VM takes the generated Java class files and it combines them into one or more Dalvik Executable (.dex) files. It reuses duplicate information from multiple class files, effectively reducing the space requirement created to support the nature of mobile operating systems.

C. Development

The Android SDK provides set of application programming interfaces (APIs). Android handset services are exposed and accessible to all applications. Android applications can share data among one another and also access shared resources on the system securely [5].

D. Application Framework

Android offers developers ability to build extremely rich and innovative applications.[5] Android Developers are free to take advantage of the hardware device, access location information, run background services, set alarms, and add notifications to the status bar. Developers access to the same framework APIs which is used by the core applications. The android architecture is designed to simplify the reuse of components; any application can publish its capabilities and any other application may then make use of those capabilities.
Underlying all applications is a set of services and systems including:

- A rich and extensible set of Views that can be used to build an application, including lists, grids, text boxes, buttons, and even an embeddable web browser
- Content Providers that enable applications to access data from other applications (such as Contacts), or to share their own data
- A Resource Manager, providing access to non-code resources such as localized strings, graphics, and layout files
- A Notification Manager that enables all applications to display custom alerts in the status bar
- An Activity Manager that manages the lifecycle of applications and provides a common navigation back stack.

E. Android Runtime

Android includes a set of core libraries that provides most of the functionality available in the core libraries of the Java programming language [5]. Every Android application runs on Dalvik virtual machine. Dalvik has written so that a device can run multiple VMs efficiently. The Dalvik VM executes in the Dalvik Executable (.dex) format which is optimized for minimal memory footprint. The VM is register runs classes compiled by a Java language compiler that have been transformed into the .dex format.The Dalvik VM relies on the Linux kernel for underlying functionality such as threading and low-level memory management.

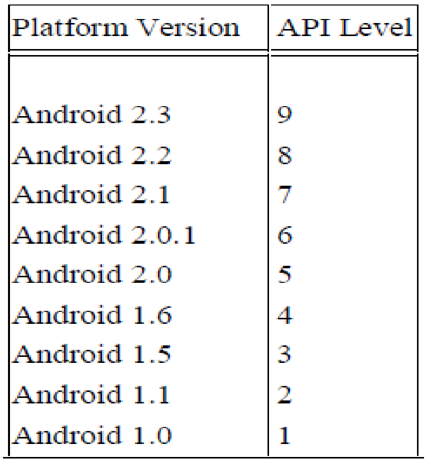
Android Version History:

The version history of the Android mobile operating system began with the release of the Android beta in November 2007. The first commercial version, Android 1.0 (First version) was released in September 2008. Android is introduce by Google and the Open Handset Alliance (OHA), and has seen a number of updates to its base operating system since its initial release.

- Alpha (1.0)
- Beta (1.1)
- Cupcake (1.5)
- Donut (1.6)
- Eclair (2.0–2.1)
- Froyo (2.2–2.2.3)
- Gingerbread (2.3–2.3.7)
- Honeycomb (3.0–3.2.6)
- Ice Cream Sandwich (4.0–4.0.4)
- Jelly Bean (4.1–4.3.1)
- KitKat (4.4–4.4.4)
- Lollipop (5.0)

API (Application Program Interface)

API Level [8] is an integer value that uniquely identifies the framework API revision offered by a version of the Android platform. The Android platform provides a different framework API that applications can use to interact with the underlying Android system. The table 1 specifies the API Level supported by each version of the Android platform.



Platform Version	API Level
Android 2.3	9
Android 2.2	8
Android 2.1	7
Android 2.0.1	6
Android 2.0	5
Android 1.6	4
Android 1.5	3
Android 1.1	2
Android 1.0	1

Table 1 :API level

III. APPLICATION DEVELOPMENT

The layered approach for android application development. This can also be used for web based application development.

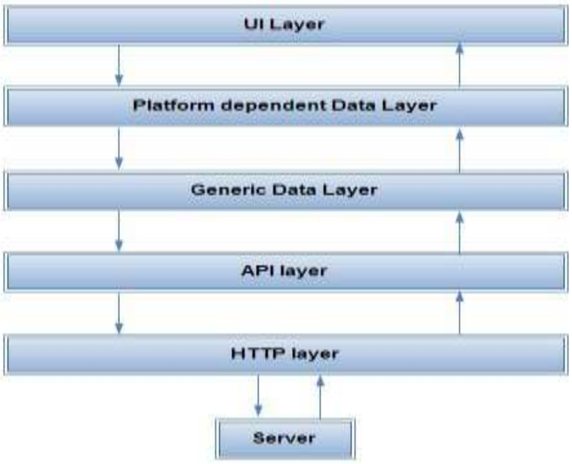


Fig. 3 Layered architecture

Figure 3 shows the layered approach for the android application development. The lowest level is HTTP layer which is responsible for sending HTTP get and post requests to the server and receiving the response. Next layer is API layer. This is for parsing the response from the server and formulating the query and passing it to the HTTP layer. The API layer will get the response from the HTTP layer and parses the response string. It also helps in extracting the necessary fields and passes it to the data layer.

The Generic Data layer contains the components that include designing business layers and implementing functionalities like caching, exceptional management, logging and validation. Next is platform dependent data layer which takes the data from the API layer and use it. It stores the data in the platform dependent way. Some classes like Adapter, List view store the data dependent on the platform. Last one the UI layer. This helps in showing the data to the user and manages user interactions. It has two components user interface components and user process components. User interface components provide a way for users to interact with the application. User process components synchronize and organize user interactions. UI layer which is responsible for views in android. It has Views, buttons, layouts etc.

A. The Application Model

In Android's application model [1], an application is a package of components, each can be instantiated and run as necessary. Components are of the following types [5] Activity components form the basis of the user interface. Each window of the application is controlled by some activity. Service components run in the background which remains active even if windows are switched. Services can expose interfaces for communication with other applications. Receiver components react asynchronously to messages from other applications. Provider components store data relevant to the application, usually in a database. Such data can be shared across applications [3], like an online photo viewing application for an Android based phone. This application may have several components. There are activities for viewing the photos on the phone in the form of grid or list.

There may be receivers for pausing application when a call comes in, and for restarting the application when the call ends. The application should not affect the high priority functionality of the device like incoming call, incoming sms, battery low indication etc.

B. Component Classes And Methods

The Android SDK [7] has a base class for each type of component (Activity, Service, Receiver, and Provider), with callback methods that are invoked at various points in the life cycle of the associated component. Each component of an application is defined by extending one of the base classes, and overriding the methods in that class. In particular:

- The Activity class has methods that are run when activity is created, or activity calls some other activity, or returns to the activity.
- The Service class has methods that are run when the Service is started, or some component binds to this service or even combination of both.
- The Receiver class has a method that is run when a message is sent to this receiver.
- The Provider class has methods to delete, query and update the data stored by this provider.

C. Component Classes and Methods

The Google Android mobile phone platform is one of the most anticipated smartphone operating systems. Smart phones can be used in place of Computers/Laptops. Mobile devices attain increasing capabilities; there are many more opportunities for novel applications [3] development. Mobile application development has reached a high demand on today's cellular market. Android defines a new component-based framework for developing mobile applications which is comprised of different numbers and types of components. Activity components are the basis of the user interface; each screen presented to the user is a different Activity [6].

Service components provide background processing that continues even after its application loses focus. Content Provider components share information in relational database form. SQLite is embedded into android which supports relational database. System includes an application with a Content Provider devoted to sharing the user's address book upon which other applications can query. Broadcast Receiver components act as an asynchronous mailbox for messages from the system and other applications. This application framework supports a flexible degree of collaboration between applications so the dependencies can be as simple or complex as a situation requires.

IV. SOFTWARE IMPLEMENTATION

The Android SDK [9] includes all the tools and APIs.we need to write compelling and powerful mobile applications. The biggest challenge with Android, as with any new development toolkit, is learning the features and limitations of its APIs.

a)*Eclipse Software*

The Eclipse Platform [12] is designed for building integrated development environments (IDEs) that can be used to create applications as diverse as web sites, embedded Java TM programs, C++ programs, and Enterprise JavaBeans TM. Many software developers spend their workday in an integrated development environment (IDE). For many Java developers, Eclipse (IDE) is a choice. Commonly cited reasons for using Eclipse include rich Java Development Tools (JDT) support and a plug-in architecture that allows tight integration of third-party functionality. Figure 4 shows the top 10 of the 42 views shipped with the default Eclipse distribution based on the percentage of developers who made at least one selection in each of the views. The 10 views are used for display purpose

- the code is static structure (Package Explorer and Outline),
- runtime and debug information (Console, Variables, Debug, and Breakpoints),
- search results (Search),Many developers used the first seven views.

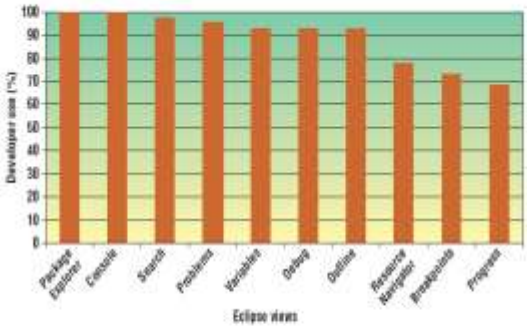


Fig.4: Top 10 Views of Eclipse

Figure 5 shows the Eclipse development environment, which is used for display and manipulating information in views. The Package Explorer view i.e. window A, for instance, displays information about the Java code i¦s package, class, and member structure.

Window B in figure 5 shows a Java editor.

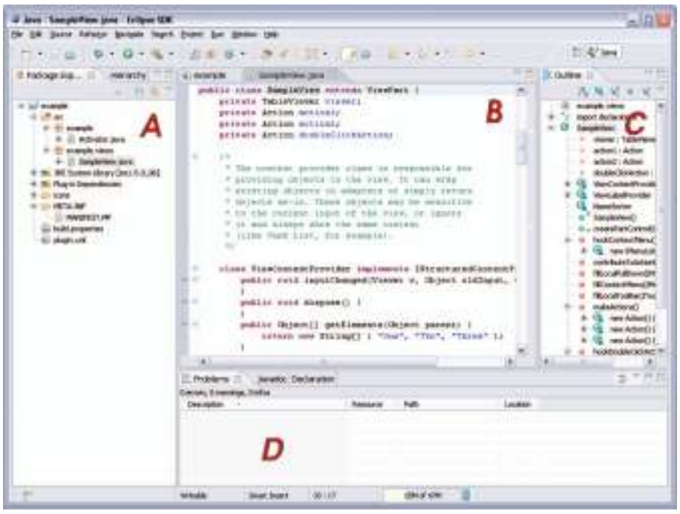


Fig. 5: Editor Window

We can create layout via drag and drop or via XML (Extensible Markup Language) source code using android editor. Android support layout manager like linear layout, Relative layout, Grid layout, Frame layout. Linear Layout having single column or row depending on the android orientation attributes. Different values for this attribute are horizontal and vertical, horizontal is the default value. Relative Layout allows positioning the widget relative to each other. This allows for complex layouts. Grid Layout separates its drawing area into: rows, columns, and cells. Frame layout is a layout manager which draws all elements on top of each other.

b)*Algorithm for developing Android Application*

Steps

i) Android applications are primarily written in the Java programming language in eclipse software.
ii) The Java source files are converted to Java class files by the Java compiler.
iii) The Android SDK contains a tool called dx which converts Java class files into a .dex (Dalvik Executable) file.

iv) The .dex file and the resources of an Android project, like images and XML files. They are packed into an .apk (Android Package) file.
v) So finally whole Android application (.apk file) will be created and deployed.

c) Android virtual device – Emulator

The Android Development Tools (ADT) include an emulator to run an Android system. The emulator behaves like a real Android device (in most cases) and allows us to test our application without having a real device

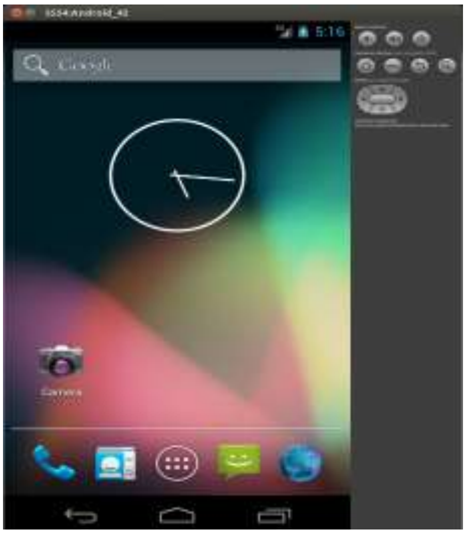


Fig. 6: Emulator Window

Footnotes
a) Poonam Bedarkar,Hemlata Meharkure
Kits Institute of Technology and Science, Ramtek,
District-Nagpur, State-Maharashtra ,Country- India

V. ACKNOWLEDGEMENT

We sincerely like to thank all the people who have directly and indirectly encouraged us and helped us in working out our research. Also a big thank to K.I.T.S. College from where we got complete support.

REFERENCES

[1] What is android? http://developer.android.com/guide/basics/what-is-android.html

[2] 3G Mobile Terminal Development Trend of the operating system [M/OL]. http://pda.c114.net/32/c4948.html, 2007

[3] Android Architecture 2010[R/OL]. http://www.cnmsdn.com/html/201003/1268713218ID2058_2 .html.

[4] Static detection of malicious code in executable programs by J. Bergeron, M. Debbabi, J. Desharnais, M. M. Erhioui, Y. Lavoie, and N. Tawbi.

[5] Android Official Website (2008)—“Android | Official Website”, <http://www.android.com/>.

[6] An Android Application Sandbox System for Suspicious Software Detection, by Thomas Bl¨asing, Leonid Batyuk, Aubrey-Derrick Schmidt, Seyit Ahmet Camtepe, and Sahin Albayrak

[7] www.blackhat.com Jeff Lessard Gary C. Kessler, “Android Forensics: Simplifying Cell Phone Examinations” Small Scale Digital Device Forensics Journal Vol. 4, No.1, September 2010, Issn# 1941-6164,pp1-12.

[8] Tahat A.A. “Mobile personal electrocardiogram monitoring system and transmission using MMS”7thInternational Carbbean Conference on Devices, Circuits and Systems, 2008, 4:1-5.

[9] Feng Wang, Jiayu Zhu, Meng Shen, “A Communication Protocol of Wireless Sensor Network for Mobile Healthcare System” IEEE/ACM International Conference on Green Computing and Communications, pp 554-559, DOI 10.1109/GreenCom-CPSCom.2010.98

[10] Sacha Gilgen, "Mobile Healthcare on Android *Devices*” University of Zurich Thesis,2010 Android Overview - Open Handset Alliance, http://www.openhandsetalliance.com/ android overview.html, last visited 22th Oct. 2010.

[11] What is Android? – Android Developershttp://developer.android.com/guide/basics/ what-is-android.html, last visited 21th Oct. 2010.

[12] Data Storage - Android Developers, http://developer.android.com/guide/topics/ data/data-storage.html#db, last visited 21th Oct. 2010.