NOUGAT: An Advance Android Technology

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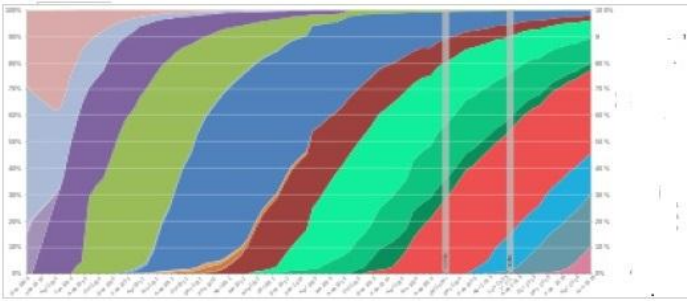
At present smart phone usage is increasing dramatically.One of the most widely used operating systems now a day is android operating system. Irrespective of ages, people all over the world prefer using up the android operating system that has so many attractive features inbuilt. The android operating system is most liked by the teenagers. The android mobile operating system is based on Linux kernel and developed by the Google. The android mobile operating system was mainly designed for smart phones and tablets with touch screen operations. Globally, if a usage comparison can be carried out between cell phone and smart phone devices. Smart phone is a personnel device which provides information, entertainment, making call and writing SMS. In this paper we have reviewed android naught version security model, application level security and security issues in Android based Smartphone and intends to explore conventional approach of mobile application execution, an approach of mobile application execution in Android.

Keywords: Android security, Open source mobile platform, Android M, Android N.

I. INTRODUCTION

Android provides a rich application framework that allows to build innovative apps and games for mobile devices in a Java language environment. The documents listed in left navigation provide details about how to build apps using Android's various APIs. The version history of Android mobile operating system began with the release of the Android alpha in November 2007. The first commercial version, Android 1.0, was released in September 2008. Android is continue all developed by Google and Open Handset Alliance (OHA), and has seen a number of updates to its base operating system since initial release. Versions 1.0 and 1.1 were not released under specific code names, but since April 2009's Android 1.5 "Cupcake", Android versions have had confectionery themed code names. Each is in alphabetical order, with most recent being Android 7.0 "Nougat", released in August 2016. Android Lollipop is a version of Android mobile operating system developed by Google, spanning versions between



Global Android version distribution since December 2009. As of September 2016, Android Lollipop (5.0 – 5.1) is the single most widely used Android version, operating on 35.0% of all Android devices accessing Google Play. The second is Android KitKat (4.4), with a share of 27.7%.

Fig 1 Android Version Distribution

5.0 and 5.1.1. Unveiled on June 25, 2014, during Google I/O conference, it became available through official lover-the-air (OTA) updates on November 12, 2014, for selected devices that run distributions of Android serviced by Google

such as Nexus and Google Play edition devices . Its source code was made available on November 3, 2014. The most prominent changes in the Lollipop release is a redesigned user interface built around Material Design as a new design language Other changes include improvements to notifications, which can be accessed from the lock screen and displayed within applications as top-of-screen banners. Google also made internal changes to platform, with the Android Runtime (ART) officially replacing Dalvik for improved application performance, and with changes intended to improve and optimize battery usage, known internally as Project Volta. As of June 2015, statistics issued by Google indicate that 12.4% of all Android devices accessing Google Play run Lollipop. Lollipop is succeeded by Android Marshmallow, unveiled in May 2015, which is in a state of developer preview as of August 2015. The android versions can be of different types. The versions are named in alphabetical order based on the sugar category termed as desserts. The versions of android are named in terms of desserts sugar treat. The final version of android was released in 2004. The version history of android started up with release of ALPHA, November 2007. The original version was originally released in 2008.This was further followed by different versions such as android 1.5 “cupcake” , android 1.6 “donut”, android 2.0-2.1 “eclairs”, android 2.2-2.2.3 “froyo”, android 2.3-2.3.7 “gingerbread”, android 3.0-3.2.6

"honeycomb", android 4.0-4.0.4 "ice cream sandwich", android 4.1-4.3.1 "jelly bean", android 4.4-4.4.4, 4.4W-4.4W.2 "kitkat", android 5.0-5.1.1 "lollipop" and finally android 6.0-6.0.1 "marshmallow" as the latest version update to be released in 2015.Android "Nougat" (codenamed N in development) is the major 7.0

Fig 2.Version of Android

release of the Android operating system. It was first released as a developer preview on March 9, 2016, with factory images for current Nexus devices, as well as with new "Android Beta Program" which also allows supported devices to be upgraded directly to Android Nougat beta via over the air update. Final release was on 22 August 2016. The final preview build was released on 18 July 2016, with build number NPD90G.

Code name	Version number	Initial release date	API level	Support Status
N/A	1.0	23 September 2008	1	Discontinued
	1.1	9 February 2009	2	Discontinued
Cupcake	1.5	27 April 2009	3	Discontinued
Donut	1.6	15 September 2009	4	Discontinued
Eclair	2.0 – 2.1	26 October 2009	5–7	Discontinued
Froyo	2.2 – 2.2.3	20 May 2010	8	Discontinued
Gingerbread	2.3 – 2.3.7	6 December 2010	9–10	Discontinued
Honeycomb	3.0 – 3.2.6	22 February 2011	11–13	Discontinued
Ice Cream Sandwich	4.0 – 4.0.4	18 October 2011	14–15	Discontinued
Jelly Bean	4.1 – 4.3.1	9 July 2012	16–18	Discontinued
KitKat	4.4 – 4.4.4	31 October 2013	19–20	Security Updates Only
Lollipop	5.0 – 5.1.1	12 November 2014	21–22	Supported
Marshmallow	6.0 – 6.0.1	5 October 2015	23	Supported
Nougat	7.0 – 7.1	22 August 2016	24–25	Supported

TABLE 1. Android Version Release Date

II. ANDROID ARCHITECTURE

Android architecture contains various layers:

i. Linux Kernel
ii. Libraries
iii. Application Framework
iv. Application

Linux Kernel: It is core of android architecture and also called as heart of android architecture because android is based on Linux kernel. It means Linux plays an important role in android. It includes display driver, camera driver, USB driver etc. It also acts as a hardware layer.

Libraries: It lies on the top of Linux kernel. Android has various in-built libraries like OpenGL, SQ Lite, Web Kit and it also support third party libraries.

Android Runtime: Android runtime lies on same layer means it presents on libraries layer. Runtime includes core libraries and DVM. Core libraries contain web kit, widget, media, net etc. These libraries are written in C/C++. DVM means Dalvik virtual machine is like JVM. It is used to run android application.

Application Framework: This layer is designed to reuse components. All API's of android are access by application framework. It contains telephony Manager, Activity Manager, Resource Manager etc. Reusable component means one application release functional component than other applications access release resources.
Application: This is the top layer of android architecture. It contains all applications like home, browser and it also contain third party library.

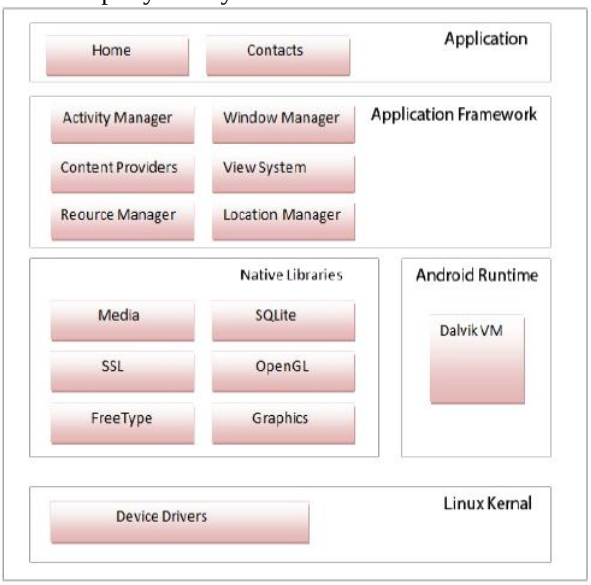


FIG 3.Android Architecture

IIIFEATURES OF ANDROID N

1 Android 7.0 will be very familiar to anyone that has seen latest Android N developer preview.
2 There is way more exciting background stuff going on in Nought tan you on the surface. Android Nougat introduces a split screen display mode for phones, in which two apps can be snapped to occupy halves of the screen. An experimental multi window mode is also available as a hidden feature, where multiple apps can appear simultaneously on the screen in overlapping windows.
3 Split screen works in both portrait and landscape mode, with the two 'windows' only being resizable in the portrait mode.

4 The quick app switching action is possible in Nought feature of all.
5 Split screen mode is a mix of intuitive and useful ideas mixed with confusion and inconsistency.
6 Bundled notifications and Quick Reply are so obvious and so useful it's surprising they haven't appeared until now.
7 It will make it easier for Android manufacturers to bring 3D Touch-like technology to Android handsets, as it's baked directly into operating system.
8 Doze mode now work not only when the device is stationary for a while but also when it is in motion..
9 The essential information contained in each settings section is now displayed on main page.
10 Data saver denies internet access to background apps when you are connected to cellular data.
11 The 2016 Nexuses will be first devices to receive Nought's seamless updates.
12 The time savers like Quick Settings mini-Toggles, Camera shortcuts and Quick app switching features really start to add up.
13 Android 7.0 moves to a file encryption basis from null disk encryption in marshmallow .

IV ANDROID PLATFORM SECURITY:

Android seeks to be most secure and usable operating system for mobiles by re-purposing classical operating system security controls to protect user data, system resources and provide application isolation. Android provides following security features to achieve these objectives are first robust security at operating system level through Linux kernel, second compulsory application sandbox for all applications, third secure interposes communication, fourth application signing, and sixth application defined permission and user have to grant permissions. In response to Stage fright family of bugs disclosed and fixed in 2015, several changes were made to harden the media stack against future vulnerabilities. Runtime integer overflow detection was implemented, preventing the majority of Stage fright like programming bugs from becoming vulnerabilities, in addition to helping fix and prevent such bugs. Android's monolithic Media Server process was redesigned to better adhere to principle of least privilege. Media Server is now split into several separate processes, each running in its own unprivileged sandbox, and granted only permissions required for its task. For example, only the Audio Server can access Bluetooth, and lib stage fright now runs within the Media Codec Service sandbox, which is only granted GPU access Further constraints were placed on media stack through sec comp. Various mechanisms were enabled to reduce the possibility of malicious code being injected or executed inside the Linux kernel, including dividing kernel memory into logical segments for code and data, with page access permissions of read only and no execute as appropriate. The kernel was also restricted from directly accessing user space memory, and stronger stack protection was enabled in GCC compiler to reduce stack smashing. To limit exposure of kernel to potentially malicious code, perf was disabled by default, ioctl commands were restricted by SE Linux, and sec comp-bpf was enabled to grant processes the ability to restrict system calls.

V SOME SMART APPLICATIONS OF ANDROID

Android is an open source platform built by Google that includes an operating system, middleware and
applications for development of devices employing cellular communications. This session takes a lookat design of Android, how it works and how it may be deployed to accelerate development of a connected device. Along with guidelines to getting started with Android, the Android SDK, its available tools and resources will be reviewed and consideration given to applications for Android beyond conventional mobile and sets such as medical devices, consumer electronics and military and aerospace systems. A brief review of how Android used for mobile and real-time application which are useful for remote tracking and monitoring of some application is studied below.

(a) Android based smart home monitoring using wireless sensors

(b) Automated Attendance Monitoring System

(c) Secure transmission medical data for pervasive healthcare system using android

(d) A prototype of Vegetarian product recognition system

VI CONCLUSION

Android N, being the current updated version of android has a handful of user friendly functions when compared to android M. As Mobile software development has evolved over time. It is clear that Android Operating System has emerged as a new mobile development platform. Android was designed to empower the developer to write innovative applications and their own source code. The platform is open source, with no upfront fees, and developers enjoy many benefits over other competing platforms. Android architecture is most important to develop applications in different sectors of our life. It acts as an Emerging Software Platform for Mobile Devices. Android is Open source mobile platform. It is the key feature of Android that will make it a leader in mobile Platform.

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