

REVIEW ARTICLE



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ANDROID OPERATING SYSTEM: INTROSPECTION OF SOFTWARE AND HARDWARE COMPONENTS

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ABSTRACT

Android is a kind of operating system which interacts with the hardware and software. Android which provides platform and operating system for mobile devices mainly deals with Linux flavor which was developed by Google and the Open Handset Alliance. Android mainly supports developers to write managed code in a Java, but does not support programs developed in native.

Keywords—linux,playstore; java; ARM; Dalvik VM

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INTRODUCTION

Android is a sophisticated Operating System supporting a great number of applications in Smart Phones. Android mainly deals with the apps which are used in real-time. The hardware that supports Android is mainly based on ARM architecture platform. More or less of the current features and specifications of android are shown in Fig 1:

| | |
|----------------------------|---|
| Application framework | • It enables reuse and replacement of components |
| Dalvik virtual machine | • It is optimized for mobile device |
| Integrated Browser | • It is based on the open source Web kit engine |
| Optimized graphics | • It is powered by a custom 2D graphics library; 3D graphics based on the OpenGL ES 1.0 specification |
| SQLite | |
| Media support | |
| GSM Technology | |
| Bluetooth, EDGE, 3G, Wi-fi | |
| Camera, GPS, Compass etc | |

Fig. 1. Specifications of Android.

Android like a bundle accompanies Android market. It was produced by Google. The primary idea here is to give the administration who claims an Android gadget. This is possible from the normal stage gave by the Google known a Google Play store. It gives office to Android clients pick, and downloads provisions which are produced by outsider consortium. There are more than 3 lakhs diversions, applications and gadgets accessible available for clients. Android applications are fundamentally created in Java Environment. Android is accessible an open hotspot for engineers to create provisions which might be further utilized for offering as a part of android business. There are around 300000 provisions created for android with in excess of 4 billion downloads. Android depends on Linux rendition 2.6 for center framework administrations, for example, security, memory administration, process administration, system stack, and driver model. For improvement, Android gives Android SDK (Software advancement unit).

Android helps a huge number of gadgets in more than 190 nations around the globe. At the point when contrasted with any viable stage Android stage is developing limitlessly consistently an alternate a huge number of client's begin their Android gadgets shockingly and searching for applications, diversions, and other media content. Android provides for you an open stage for making applications and diversions for Android clients all over, and a commercial center for disseminating to them quickly.



Fig. 2. Android Growth in device activations.

In India, the floor height of express and long-distance trains is not compatible with the platform height and changes. In most cases, the distance increases beyond comfort limit of the passengers. The problem becomes more prominent when people struggle to climb aboard and get down from trains on to the platforms because of steep exterior steps which often lead to accidents and injuries. This is mostly seen with small kids, women, elderly, people with arthritis or gout and others and also while moving heavy luggage in and out of the train. The problem aggravates when the train stops only for a few minutes at a station and the number of passengers getting down and up are numerous. This problem causes delays at the stations and unnecessary rush. It is a problem in all stations. The steep vertical steps can prove to be a hindrance in case of a quick rescue mechanism. In all the above cases, a simple construction of platform risers and gap fillers can make a huge difference. Risers can be used to adjust platform to train floor difference and gap fillers to bridge same level gaps between the train and platform.



Fig 1: The floor to platform level in trains is at an uncomfortable level, even with the side handles and the gaps can be dangerous

THEORY

The maximum gap allowed between the platform and the floor of the train coaches is 342 to 437 mm. The ideal platform height is in the range of 760 to 840 mm. Although this height is acceptable, it proves to be a burden to some of the passengers especially women and children. In some cases it is seen that the gap between the floor of the train and the platform is 460 to 470 mm. for at a 760 mm. high platform and 380 to 390 mm. height for an 840 mm. High platform. Both can prove to be dangerous. New trains have modern air suspension systems, in which air springs do not compress much, thereby maintaining the gap at the dangerous level. When raised platforms are in use, the train width must also be compatible, to avoid both large gaps and mechanical interference which causes equipment damage.

It is also known that the disabled have to be carried onto the train in specially designed trolleys or lifters. The use of these devices is time consuming as well as not available in many stations. The procedure needs to be simpler, quicker and which can be performed by one other person.



Fig 2: Disabled people need mobile lifters and devices to get onboard the train coaches

Changing the platform and the train floor height on every platform or train, to make it compatible, is extremely costly and not a feasible solution to this problem. A simple device can eliminate this problem. An inclined ramp with horizontal standing space at the edge, fitted above the top edge of the platform, can serve a variety of purposes and solve all the above discussed problems. In case of same level platforms with gaps, like in some railway platforms or Metro railway platforms, platform gap fillers can be used to bridge the gaps and prevent accidents.

The added advantage is that, the platform risers and gap fillers can be made from hard polymer or plastic and can be used as a means to manage the plastic waste pollution. Non-biodegradable plastic and industrial polymers or even rejected polymer parts can be used to manufacture the platform risers and gap fillers.

ANDROID: A NEXT GENERATION PLATFORM

In spite of the fact that Android has numerous inventive peculiarities not accessible in existing versatile stages, its originators likewise leveraged numerous reliable methodologies demonstrated to work in the remote world. It's actually that a large portion of these gimmicks show up in existing exclusive stages, yet Android joins them in a free and open design, while at the same time tending to an significant number of the defects on these contending stages. The Android mascot is somewhat green robot, indicated in Figure 3. you'll see this little fellow (young lady?) regularly used to delineate Android-related materials. Android is the first in another era of versatile stages, providing for its stage designers a unique edge on the opposition. Android's fashioners analyzed the profits and inconveniences of existing stages and after that join their best gimmicks. In the meantime, Android's planners stayed away from the slip-ups others endured previously.



Fig. 3. The Android mascot.

ANDROID'S UNDERLYING ARCHITECTURE

The Android stage is intended to be more blame tolerant than a considerable lot of its forerunners. The handset runs a Linux working framework, whereupon Android provisions are executed in a safe manner. Every Android provision runs in its own particular virtual machine (Figure 4). android requisitions are overseen code; thusly, they are significantly more averse to cause the telephone to crash, prompting fewer cases of gadget debasement (additionally called "bricking" the telephone, or rendering it futile).

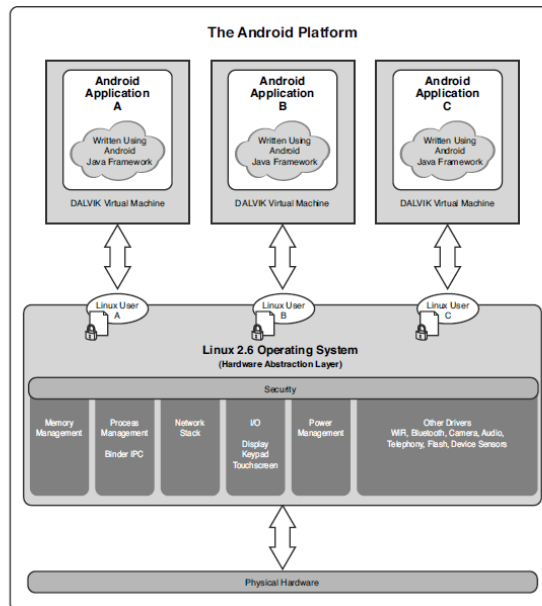


Fig. 4. Diagram of the Android platform architecture.

ANDROID : SOFTWARE STACK

Android is an operating system works on the Linux kernel. Every mobile or tablet comes with the Linux kernel version number. A client interface focused around immediate control, composed basically for touch screen cell phones, for example, cell phones and tablet workstations, utilizing touch inputs, that approximately relate to certifiable movements, such as swiping, tapping, squeezing, and opposite squeezing to control on-screen items, and a virtual console. In spite of being essential intended for touchscreen information, it additionally has been utilized within TVs, recreations comforts, digital cameras, and different gadgets.



Fig. 5. Android's architecture diagram.

linux kernel

At the lowest part of the layers is Linux - Linux 2.6 with more or less 115 patches. This gives essential framework's usefulness like methodology, administration, memory administration, gadget administration like Polaroid, keypad, show and so forth. Additionally, the bit handles all the things that Linux is better than average at, for example, systems administration and an unlimited cluster of gadget drivers, which take the torment out of interfacing to fringe equipment.

Libraries

On top of Linux bit there is a situated of libraries, including open-source Web program motor Webkit, well known library libc, Sqlite database which is a valuable archive for capacity and offering of requisition information, libraries to play and record sound and feature, SSL libraries answerable for Internet security and so on.

Android Runtime

This is the third segment of the construction modeling and accessible on the second layer from the base. This segment gives a key part called Dalvik Virtual Machine which is a sort of Java Virtual Machine uncommonly composed and enhanced for Android. The Dalvik VM makes utilization of Linux center peculiarities like memory administration and multi-threading, which is characteristic in the Java Language. The Dalvik VM empowers each Android provision to run in its own particular methodology, with its own particular case of the Dalvik virtual machine. The Android runtime likewise gives a set of center libraries which empower Android provision engineers to compose Android requisitions utilizing the standard Java programming Language.

Application Framework

The Application Framework layer gives numerous larger amount administrations to provisions as Java classes. Order originators are allowed to make use of these organizations in their procurements.

Important blocks of Application framework are:

- Activity Manager: Manages the activity life cycle of applications
- Content Providers: Manage the data sharing between applications
- Telephony Manager: Manages all voice calls. We use telephony manager if we want to access voice calls in our application.
- Location Manager: Location management, using GPS or cell tower
- Resource Manager: Manage the various types of resources we use in our Application

Applications

We will discover all the Android requisition at the top layer. You will compose your requisition to be introduced on this layer just. Cases of such requisitions are Contacts Books, Browser, Games and so on.

Android Platform Differences

Android is hailed as "the first finish, open, and free portable stage."

- **Complete:** The creators took a thorough methodology when they created the Android stage. They started with a safe working framework and assembled a strong programming structure on top that takes into account rich provision advancement good fortunes.
- **Open:** The Android stage is given through open source permitting. Designers have remarkable access to the handset characteristics when creating provisions.
- **Free:** Android provisions are allowed to create. There are no authorizing or sovereignty charges to create on the stage. No obliged enrollment charges. No obliged testing expenses. No obliged marking or accreditation charges. Android requisitions could be circulated and popularized in a mixed bag of ways.

No Distinctions Made Between Native and Third-Party Applications

Not at all like other versatile improvement stages, there is no refinement between local provisions and engineer made requisitions on the Android stage. Gave the requisition is allowed the proper consents, all requisitions have the same access to center libraries and the underlying equipment interfaces. Android handsets ship with a set of local provisions, for example, a Web program and contact chief. Outsider requisitions may incorporate with these center provisions and even stretch out them give a rich client experience.

Android: Commonly Used Packages

With Android, portable designers no more need to reinvent the wheel. Rather, designers use recognizable class libraries uncovered through Android's Java bundles to perform normal errands, for example, representation, database access, system access, secure interchanges, and utilities, (for example, XML parsing). The Android packages include support for

- Common user interface widgets (Buttons, Spin Controls, Text Input)
- User interface layout
- Secure networking and Web browsing features (SSL, WebKit)
- Structured storage and relational databases (SQLite)
- Powerful 2D and 3D graphics (SGL and OpenGL ES 1.0)
- Audio and visual media formats (MPEG4, MP3, Still Images)
- Access to optional hardware such as Location-Based Services (LBS), WiFi, and Bluetooth

FEATURES IN ANDROID*Interface*

Android gives the capability to run provisions which change the default launcher and subsequently the appearance and remotely unmistakable conduct of Android. These appearance progressions incorporate a multi-page dock or no dock, and a lot of people more changes to crucial peculiarities of the client interface.

Applications

Android has a developing determination of outsider provisions, which could be procured by clients either through an application store, for example, Google Play or the Amazon App store, or by downloading and introducing the provision's APK document from an outside website. Google Play Store permits clients to skim, download and upgrade requisitions distributed by Google and outsider engineers, and the Play Store customer requisition is preinstalled on gadgets that consent to Google's similarity prerequisites and permit the Google Mobile Services programming. The customer requisition channels the arrangement of accessibility provisions down to those good with the client's gadget, and designers may limit their requisitions to specific bearers or nations for business reasons.

Memory management

Since Android gadgets are typically battery-fueled, Android is intended to oversee memory (RAM) to keep power utilization at least, rather than desktop working frameworks which by and large expect they are joined with boundless mains power. At the point when an Android application is no more being used, the framework will naturally suspend it in memory – while the application is still in fact "open", suspended applications expend no assets (for instance, battery power or transforming power) and sit without moving out of sight until required once more. This has the double profit by expanding the general responsiveness of Android gadgets, since provisions don't have to be shut and revived without any preparation each one time, and likewise guaranteeing that foundation requisitions don't devour control unnecessarily.

HARDWARE

The principle fittings stage for Android is the 32-bit Armv7 architecture. The Android-x86 task gives backing to the x86 building design and Google TV utilizes an extraordinary x86 variant of Android. In 2012, Intel

processors started to show up on more standard Android stages, for example, telephones. In 2013, free scale advertised backing for Android on its i.e.MX processor, particularly the i.MX5X and i.MX6X series.

Security and Concealment

Android provisions run in a sandbox, a detached territory of the framework that does not have entry to whatever remains of the framework's assets, unless access authorizations are unequivocally allowed by the client when the provision is introduced. Before introducing a provision, Play Store has shown all obliged consents: a diversion may need to empower vibration or sparse information to a SD card, for instance, yet will not have to peruse SMS messages or access the phone book. In the wake of surveying these consents, the client can decide to acknowledge or reject them, introducing the requisition just on the off chance that they acknowledge. The sandboxing and consents framework diminishes the effect of vulnerabilities and bugs in provisions, yet designer perplexity and constrained documentation have bought about requisitions routinely asking for unnecessary authorizations, lessening its viability.

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