

Evolution of Android Applications

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Abstract

As we all know, the development of hardware for mobile devices is progressing, and the performance index is currently far higher than the real software configuration needs. The functionalities of a phone are becoming more reliant on software or applications. The creation of an Android mobile platform application is described in this article. For mobile apps, the development environments of Windows Mobile and Apple's iPhone are very simple. Users benefit from mobile apps because they provide a speedy and trustworthy experience. This study focuses on the Android architecture, which is based on Linux version 2.6. It is an open-source mobile phone operating system based on Linux. Android applications are created using the Java programming language. The Android SDK includes a collection of application programming interfaces (APIs) as well as the Android Studio Platform for developing apps.

Keywords: *PHP Framework, Android architecture, Android Studio, Android Application*

INTRODUCTION

The introduction of smart phones has altered the definition of mobile phones in recent years. It has evolved into more than simply a communication tool; it has also become an integral component of people's

everyday lives. Various Android apps offer entertainment and other necessities of everyday living. It allows people to connect with one another. For mobile developers, this is a fantastic and exciting time. Android is an open source

architecture that contains an operating system, application framework, Linux kernel, middleware, and apps, as well as a collection of API libraries for creating mobile applications that may give mobile phones the look, feel, and function. Developers may now use the Android platform to improve the dependability, usability, and other qualities of their current products. Android developers may simply design application code that makes mobile hardware more helpful and user pleasant without any difficulty or complication. Mobile apps are a fast developing segment of the global mobile market. We address Android Studio for mobile app development, Laravel (PHP Framework), layered approach for Android, and MySQL for database design and development in this paper. Android is a Google-developed open-source mobile

phone operating system based on Linux, and it is presently the most frequently used operating system on mobile phones. The Java programming language is used to create Android mobile applications, allowing developers to write code in the Java programming language. These scripts can control mobile devices using Google approved Java libraries. The Android mobile operating system also offers a versatile environment for the creation of Android mobile applications, since developers may utilise both Java IDEs and Android Java Libraries. Android Mobile Application Development is mostly utilised to generate creative and user- friendly apps. Mobile Development has considerable experience working on projects like as video and music players, game applications, picture viewers and editors, and more.

ANDROID ARCHITECTURE

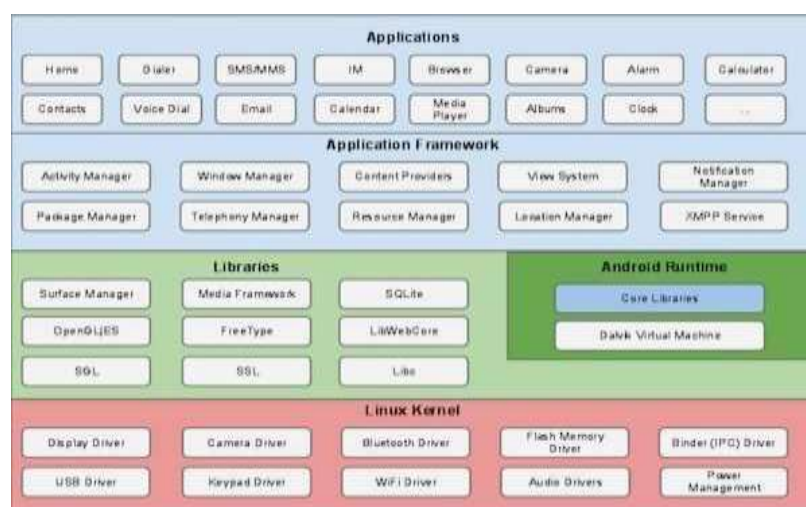


Figure 1 Android Architecture

The Android operating system architecture was investigated. Android is a Linux-based operating system that consists of a stack of software components separated into five parts and four primary layers, as illustrated in the architectural diagram below. Each layer of the lower encapsulates the higher while offering a call interface.

Application Framework

Developers may readily access the API foundation of the main applications, and they can also alter it to suit their needs. The application framework makes it easy to comprehend how its components may be reused. If you wish to access the functional components of another Android application, you must first determine if the application has been released and then follow the framework's security guidelines. This reuse mechanism allows users to replace programme components in the same way that users may change programme elements.

Libraries and Android Runtime

The Android Runtime and Android Library are the two primary components of the library.

The Dalvik virtual machine runs files in the Dalvik Executable (.dex) format,

which is designed for small memory footprint. The Android Runtime is made up of a Core Java Libraries and a Dalvik virtual engine. The Fundamental library provides the majority of the core Java libraries' functionalities. DVM stands for register virtual machine, and it specialises in mobile device development.

The Android system library not only strengthens the application framework, but it also serves as a vital link between the application framework and the Linux kernel. This system library is enhanced using the C or C++ programming languages. The various aspects of the Android system may also make use of these libraries. The application framework is used to deliver services to developers.

Linux Kernel

Linux 3.6 is the last layer of the Android architecture, containing around 115 fixes. This creates a degree of uncertainty between the device hardware and all of the necessary hardware drivers, such as display, camera, and keypad. In addition, the kernel handles all of the things that Linux excels at, such as networking and a vast number of device drivers, which alleviate the strain of interacting with peripheral devices. Internal storage, process management, internet protocol,

bottom-drive, and other key services are all provided by the kernel system, which is based on the Linux kernel.

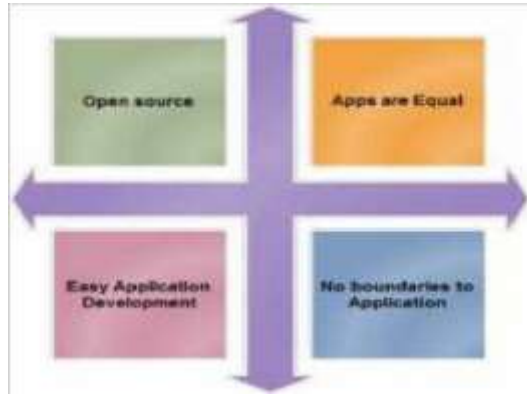


Fig. 1 Four core features of the android platform

Android is an open source mobile operating system created by Android, Inc., which was acquired by Google in 2005. Android was first announced in 2007, along with the formation of the Open Handset Alliance, a group of software, hardware, and telecommunications companies dedicated to advancing open standards for mobile devices. According to Wikipedia, over one million Android applications were launched on the Google Play store in July 2013, with over 50 billion apps downloaded. According to Wikipedia, a study of mobile application developers conducted in April–May 2013 indicated that more than 71% of developers built apps for Android.

Android Version History

With the introduction of the Android beta version in November 2007, the Android mobile operating system began its version history. The first commercial version of Android, version 1.0, was launched in September 2008. As we all know, Android was created by Google and the Open Handset Alliance (OHA), and it has seen a lot of modifications since its first release.

- Alpha (1.0)
- Beta (1.1)
- Cupcake (1.5)
- Donut (1.6)
- Éclair (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)
- Marshmallow (6.0)

ANDROID APPLICATION DEVELOPMENT IMPLEMENTATION Prototyping

Prototyping is a crucial element of the app development process since it determines how the app will appear when it is implemented. For prototyping the Android

App UI design, Photoshop CS6 was utilised.

XML-based user interface design- Implementation of the app – View of the app View

With the newest ripple effect and flat UI with fragments in the app, Material Design was employed. Instead of just activity, the pieces provide you additional control over the element. Genymotion was used to test the UI on various Android versions.

Testing of UI in different versions of android using Genymotion

The app's maximum backwards compatibility has been set to Ice Cream Sandwich (Android 4.0.3) and Marshmallow (Android 6.0), and it has

just been upgraded to Android N preview version.

Implementation of Singleton class of Volley Instantiation

The Volley library has been used to asynchronously send data from and to the server so that the app does not stall a functioning network job in the main thread. In the form of a queue, the singleton class maintains track of all requests. Model implementation for parsing JSON input from the server

The JSON data from each server request is first processed and stored in Saved Instances, which acts as a local cache for the data to improve the app's speed when it has a big UI list.

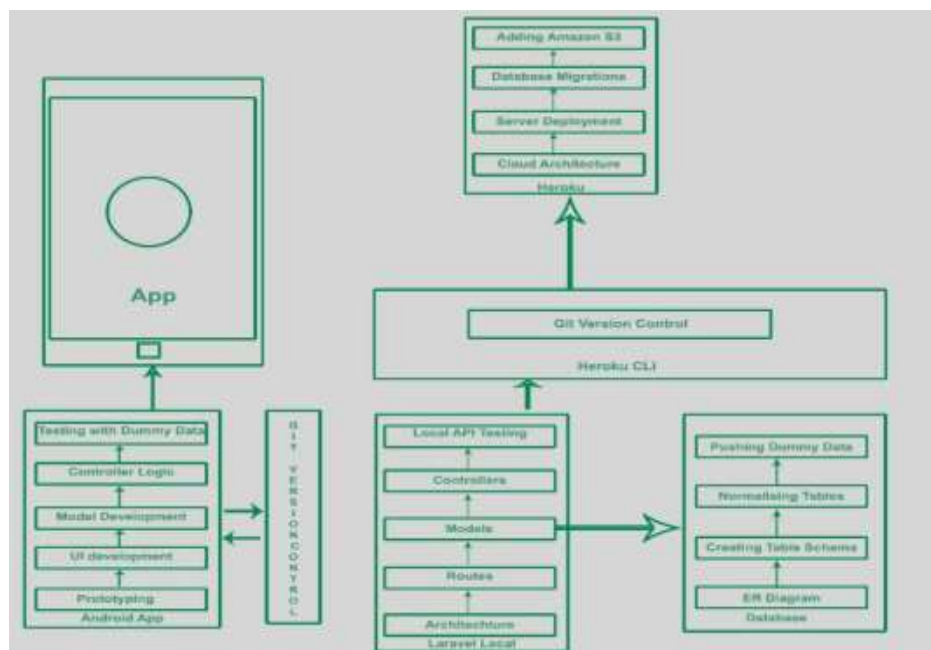


Fig. 2 Design Diagram

API (Application Program Interface)

API Level is a numeric value that uniquely identifies a version of the Android platform's framework API revision. The Android platform provides a plethora of framework APIs that apps may utilise to interface with the Android system's hidden components. In table 1, we've listed the API Levels that each version of the Android platform supports. API stands for application programming interface, and it is a programming interface for other online or app-based technologies. The API should be platform-agnostic, allowing any platform to use the API calls according to their requirements. In this scenario, the API returns data in JSON

format, allowing any platform that has an HTTP connection to use it and construct their own platform. The code should be as general as feasible because the API development may be utilised by any application.

APIs may be created using a variety of technologies, however PHP has been chosen owing to its popularity and open source nature. Although the API code may be written entirely in PHP core, there are several security concerns and things to accomplish in PHP core that need reinventing the wheel. As a result, using the framework is the ideal alternative for API development.

Table 1: API level

Android Version & API Level

Platform Version	API Level	VERSION_CODE
Android 8.0	19	STKAT
Android 8.1	18	JELLY BEAN MR1
Android 8.2, 8.2.2	17	JELLY BEAN MR1
Android 8.1, 8.1.1	16	JELLY BEAN
Android 8.0, 8.0.5	15	ICE CREAM SANDWICH MR1
Android 8.0, 8.0.1, 8.0.2	14	ICE CREAM SANDWICH
Android 7.2	13	HONEYCOMB MR1
Android 7.1.2	12	HONEYCOMB MR1
Android 7.0.2	11	HONEYCOMB
Android 7.3.8, Android 7.3.3	10	GINGERBREAD MR1
Android 7.3.2, Android 7.3.1, Android 7.3	9	GINGERBREAD
Android 7.2.2	8	FROYO
Android 7.1.2	7	GLASS MR1
Android 7.0.1	6	GLASS R.1
Android 7.0	5	GLASS
Android 6.0	4	DONUT
Android 5.0	3	ICE CREAM

Selecting PHP framework

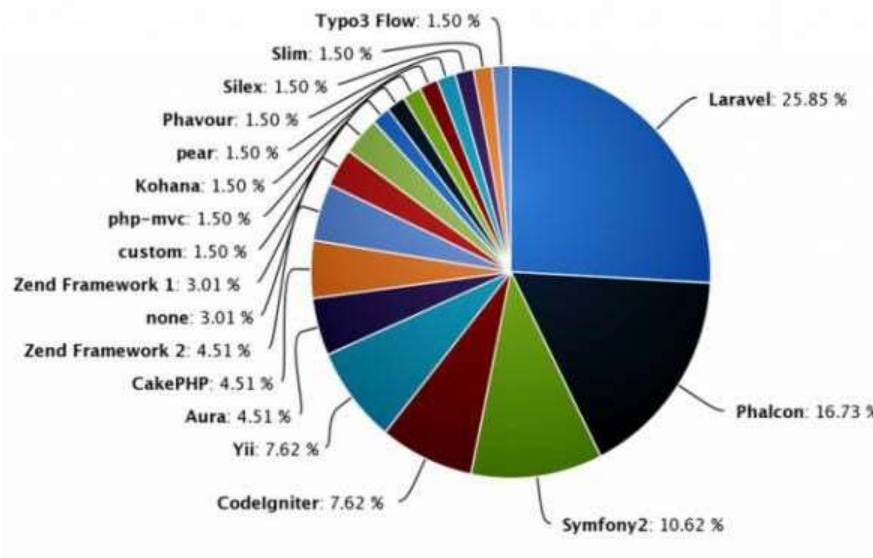


Fig. 3 PHP Framework

Following are the reasons for selecting the Laravel framework

- Popularity
- Community Support
- Security
- Backed with Zend Foundation which is the maintained by IBM and Google
- OAuth 2.0 Implementation
- Multiple Database Support
- Command Line Tools
- Strict MVC Based framework
- PHP Auto load Feature
- Composer Dependency Manager
- Modular Approach
- Less Learning Curve

Android Studio

The official integrated development environment (IDE) for Android platform

development is Android Studio. It was announced during the Google I/O conference on May 16, 2013. Android Studio is open source software licenced under the Apache License 2.0. Starting with version 0.1 in May 2013, Android Studio was in early access preview mode, then moved to beta mode with version 0.8, which was published in June 2014. Starting with version 1.0, the first stable build was published in December 2014. Android Studio is a programming environment for Android that is based on Jet Brains' IntelliJ IDEA software. It superseded Eclipse Android Development Tools (ADT) as Google's preferred IDE for native Android application development and is available for download on Windows, Mac OS X, and Linux.

Table 2 Android studio vs. Eclipse

Feature	Android Studio	Eclipse ADT
Build system	Gradle	Apache Ant
Maven-based build dependencies	Yes	No
Build variants and multiple-APK generation	Yes	No
Advanced Android code completion and refactoring	Yes	No
Graphical layout editor	Yes	Yes
APK signing and keystore management	Yes	Yes
NDK support	Yes	Yes

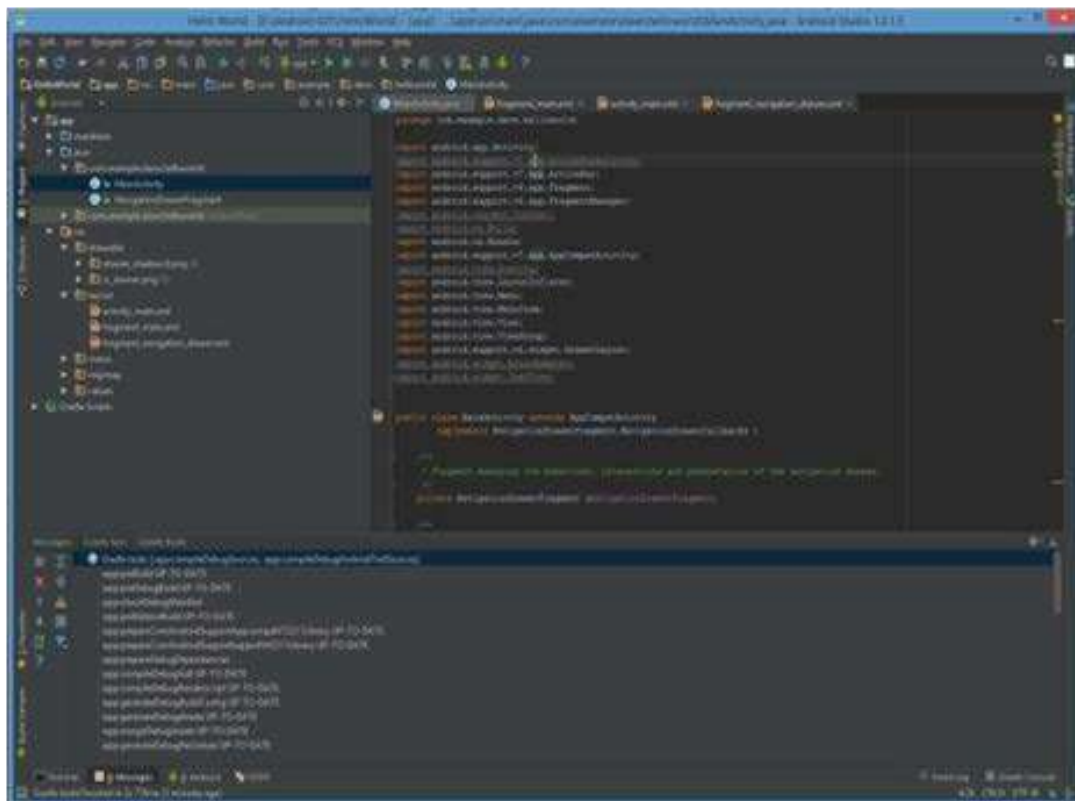


Fig. 5 Android Studio

CONCLUSION

This article has demonstrated what Android is and how it interacts with Java via XML, JSON, and APIs. It explains

how to set up a development environment as well as the emulator (AVD). It has demonstrated what Android Application Development focuses on, such as XML-

to-Java binding on Android. The many versions of Android and their quick evolution in terms of new SDKs, as well as how developers use open source APIs, have all been explored. The advantages of the Android software ecosystem are also discussed in the report, which demonstrates a favourable environment for developers. Android and its SDK have a bright future ahead of them. With new features and personal preferences, Android has ushered in a new age in the distribution of open source software equipment for mobile devices, such as free utilities and games. Furthermore, because more than 50% of the population uses and works on Android, we believe it will shape the future. Furthermore, the development environment and tools will be developed and extended in the future, making the development process more precise and effective.

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