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Evaluation and Analysis of Android Operating Systems

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Abstract*: The world is in transition to mobile computing from desktop pc and laptops. There are almost six billion users around the globe. The mobile phones around us are the combination of hardware and the software. There are different Mobile OS as android OS, iOS and windows. Android OS is an open source operating system used in android mobiles.* ***Android is popular in technology companies that require a ready-made, low cost and customizable operating system for high-tech devices.*** *There are various versions from cupcake (**April 27, 2009) to Oreo (August 2017)** of android. In this paper features of different android versions are compared on the basis of user experience, processing, security and memory management.*
Keywords: iOS, Mobile OS, cupcake, Oreo

I. INTRODUCTION

A smartphone is a cellular telephone with an integrated computer and other features not originally associated with telephones, such as an operating system, Web browsing and the ability to run software applications. The first smartphone was IBM's Simon, which was presented as a concept device (rather than a consumer device) at the 1992 COMDEX computer industry trade show. When Simon debuted, the smartphone's features clearly differentiated it from other cell phones, which at that time were just telephones that didn't need a landline connection. There is no standard definition that clearly delineates a smartphone -- many devices marketed simply as cell phones offer similar features to those marketed as smartphones.

Back in mid-2007, Nokia and Symbian were on top – Symbian had 65 percent of the Smartphone market, while one in every two phones sold worldwide carried the Nokia logo. Android has around three-quarters of the Smartphone market, but many of the characteristics that helped make it successful were used by Symbian years before. Like Android, Symbian – before it became Nokia's pet – was used in handsets by a number of the largest manufacturers, including Samsung. As Smart phone and Android system getting popular the operation like Listening to music, watching videos , tweeting and some other can be moved from computer to mobile phone*[1]*

Android is a software platform and operating system for mobile devices, based on the Linux kernel, and developed by Google and later the Open Handset Alliance*[2]*. Over the years, Mobile OS design has experienced a three-phase evolution from the PC-based operating system to an embedded operating system to the current Smartphone-oriented operating system in the past decade *[6]*.The worldwide sales of mobile devices, especially for smartphones, grew by an increasing rate over the last years*[7]*. Some of the Smartphone's' brands use it is own operating system, such as, Blackberry and I phones. On the other hand, a strong well Known operating system is famous used by more than one brand, which is Android *[8]*. Android was announced a decade ago, on November 5, 2007. Since that initial announcement, the mobile platform has come a long, long way. Android has the largest install base of any operating system, mobile or desktop. And it's not just in phones and tablets: smart TVs, cars, smart watches and smart home devices are all powered by the little green man. From the original beta to Android Nougat through Android Froyo, Lollipop and Marshmallow, we track Android's rise from unlikely start to acquisition by Google and today's dominance.

II. LITERATURE REVIEW

Android is the newest mobile device operating system, and this is one of the first researches to help the average programmer become a fearless Android developer*[3]*. The development of Android started in 2003 by Android, Inc., which was purchased by Google in 2005. Android is continually developed by Google and the Open Handset Alliance, and it has been a number of updates to its base operating system since the initial release. API level is basically the Android version. Instead of using the Android version name (e.g. 2.0, 2.3, 3.0, etc) an integer number is used. This number is increased with each version as functionality adds up.as shown in Table 1

ANDROID VERSION	INITIAL RELEASE DATE	API LEVEL
Cupcake	April 27,2009	3
Donut	September 15,2009	4
Éclair	October 26,2009	5-7
Froyo	May 20,2010	8
Gingerbread	December 6,2010	9-10
Honey comb	February 22,2011	11-13
Ice-Cream Sandwich	October 18,2011	14-15
Jelly Bean	July 9,2012	16-18
KitKat	October 31,2013	19
Lollipop	November 12,2014	21-22
Marshmallow	October 5,2015	23
Nougat	August 22,2016	24-25
Oreo	August 2017	26-27

Table 1: Android version with releasing date and API level [3]

The developers write their script in Java, and then download the apps from the third party sites or online stores. In February 2012, 450,000 apps were available for Android but the estimated number of downloads since December, 2011 was more than 10 billion. There are over 300 million Androids in use and over 850,000 devices activated every day. Android is the one of the most used mobile operating system with a market share of 48% and Over 400,000 applications available in Google play store. Android apps have been installed over 10 billion times and cover a vast range of categories from games and entertainment to financial and business services. Android software development and the Google Play Market are relatively open and unrestricted. This offers both developers and users more flexibility and freedom, but also creates significant security challenges *[2]*.

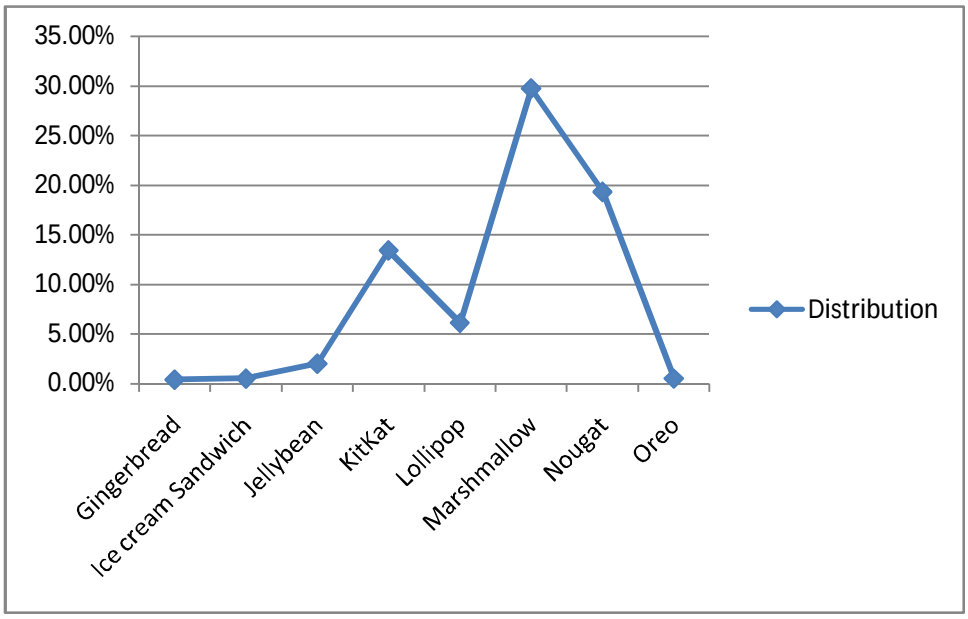

Fig: 1Distribution of Android version*[9]*

A. Features of Android version

All android versions get, apart from their numeric version number, code-name, which is assigned by Google. Like the naming of Ubuntu versions (names of animals with an adjective), Android version names are names of, mostly American, sweets, where the first letter is in alphabetical order.

The assignment of numeric and textual version names are not always consistent. Android 4.0 and Android 4.1, for example, have different version names, but Android 5.0, 5.1 and 5.1.1 share the same version name.

Marshmallow Oreo

Fig: 2 Symbols of Android version[4]

1) *Cupcake* (v1.5): Debuted in fall 2008.It comes with Bluetooth A2DP, AVRCP support Soft-keyboard with text-prediction Record/watch videosas well as improvements to existing features such as UI changes for application management and several Google apps.
2) *Donut* (v1.6) : Debuted in fall 2009.It supports Gesture framework Turn-by-turn navigation. It support for CDMA smart phones, additional screen sizes, a battery usage indicator, and a text-to-speech engine.
3) *Éclair* (v2.0) :Debuted in October 2009:The operating system also provides improved typing speed on virtual keyboard, along with new accessibility, calendar, and virtual private network APIs. For internet browsing, Android Éclair also adds support for HTML5.
4) *FroYo* (v2.2) : Debuted in fall 2010.It include Speed improvements JIT implementation USB Tethering Applications installation to the expandable memory Upload file support in the browser Animated GIFs.
5) *Gingerbread* (v2.3) : Debuted in December 2010It support for SIP VoIP internet telephony and improved text input using the virtual keyboard, with improved accuracy, better text suggestions. It also voice input capability. Enhanced copy/paste functionality, allowing users to select a word by press-hold, copy, and paste.
6) *Honeycomb* (v3.0): Debuted in February 2011.It provide System Bar, which runs along the bottom of the screen, Action Bar, which appears at the top of the screen, a redesigned keyboard,Support for multi-core processor it also provideSecurity improvements, such as encrypted storage and support for passwords with complex characters.
7) *Ice Cream Sandwich* (v4.0) :Debuted in October 2011: It provide Facial recognition (Face Unlock) ,UI use Hardware acceleration ,Better voice recognition (dictating/Voice typing) Web browser, allows up to 16 tabs Updated launcher .
8) *Jelly Bean* (v4.1, v4.2 and v4.3) : Debuted in June 2012: It comes with Dial pad auto-complete ,Photo Sphere enhancements Camera app ,UI updated 4K resolution, support Ability to create restricted profiles for tablets, support Bluetooth Audio/Video Remote, Control Profile (AVRCP) 1.3 support Security and performance enhancements.
9) *KitKat* (v4.4): Debuted in November 2013. Kitkat include Screen recording, New Translucent system, UI Enhanced notification access, System-wide settings for closed captioning.
10) *Lollipop* (v5.0): Debuted in November 2014. Lollipop support Multiple SIM cards support, Quick settings, shortcuts to join Wi-Fi networks or control Bluetooth devices,Lock protection if lost or stolen, High Definition voice call, and Stability and performance enhancements.

11) *Marshmallow* (v6.0):Debuted in November 2015.USB Type-C support, Fingerprint Authentication support, Better battery life with "deep sleep".
12) *Nougat*(v7.0):Debuted in September 2016.It providesemoji,better multitasking, and Multi-window mode.
13) Oreo: Debuted in Aug 2017.PIP: Picture-in-Picture with resizable windows, Android Instant apps, improved notifications system, improved system settings Lock screen redesign[10]

III.CONCLUSION

The biggest appeal of smart phones is their functionality. According to mentioned features it works as portable computer. In window's operating system has very limited applications but Android support large verities of application. As it include feature of multitasking ,clock, calendar improvement, window resizable, notification system and internet facilities such as social media, online shopping etc makes it more favorite to peoples As its come to know every alphabetically version from cupcake to Oreo has new features.

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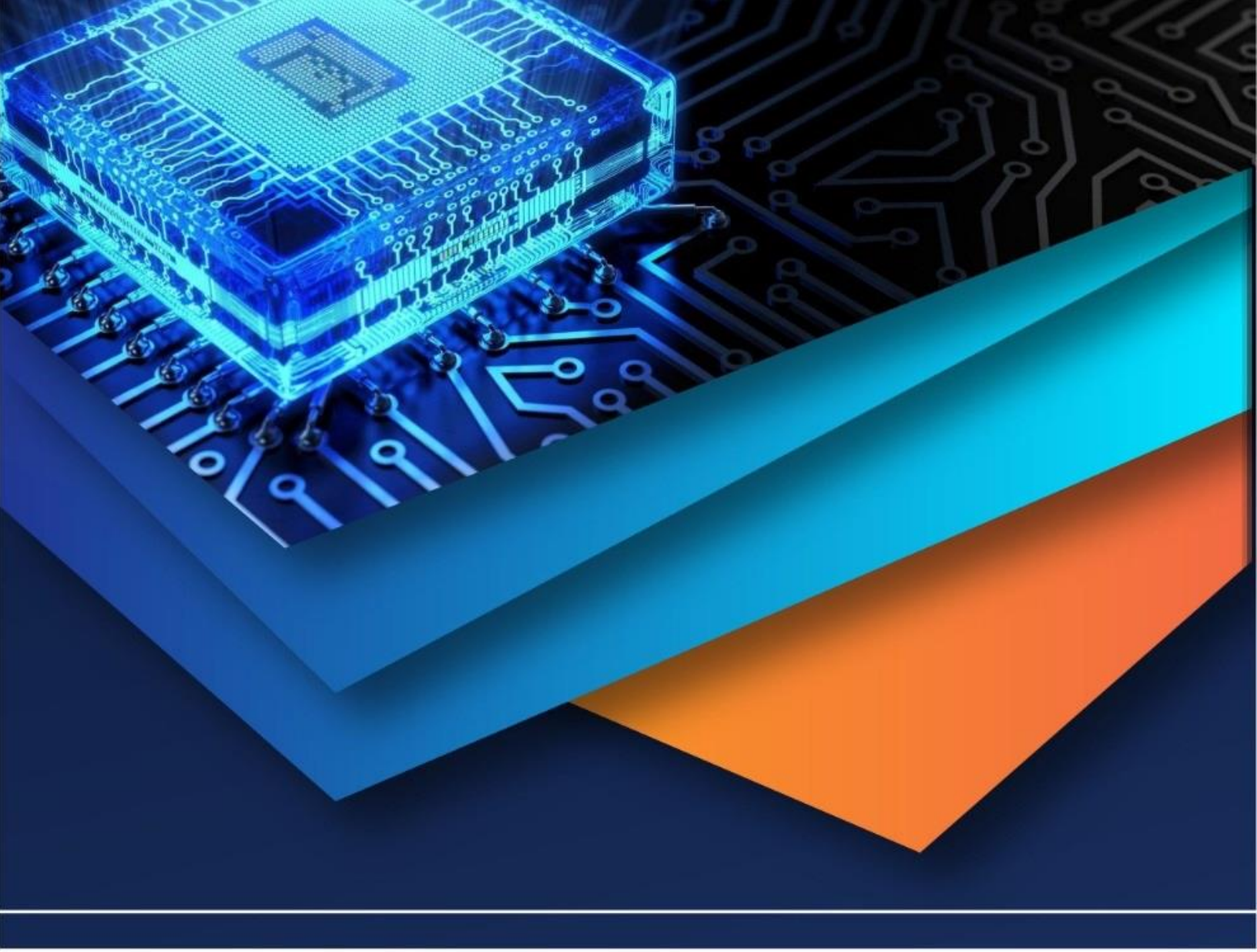

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