Performance Analysis: Ubuntu Touch v/s Android OS

Asif Sardar Shaikh[1], *M.E. Second year student, Department of E&Tc, Siddhant COE, Maharashtra, India*
M.U. Inamdar[2], *Assistant Professor, Department of E&Tc, Siddhant COE, Maharashtra, India*

***Abstract*— The Mobile device is a part & parcel of today's human life. Along with its mass usage the malicious attacks on the applications used in these devices are also increasing. For the instance, the Android OS suffers from virus attacks viz. Trojans, spyware, adware, horses, worms etc. This paper addresses some of these problems along with certain new features in the newly customized mobile version of Linux OS viz. Ubuntu Touch. Further this paper compares the performances of both the OS theoretically as well as practically.**

***Index Terms*— Android, Android limitations, Open source standard, Profiling and Analysis, Ubuntu Touch Concept.**

I. INTRODUCTION

Technically, the term "Linux" refers to the OS'kernel. Many organizations (RedHat, Mandriva, and Fedora) package the Linux kernel, along with supporting programs like GUI and Utilities. These are called distributions or distros. While the mobile industry is flooded with ideas like comprehensive mobile platform, the consumers prefer a simple but innovative platform. Maybe as needs grow end-users will be gravitated towards a truly open-source platform and they'll expand the sophistication on their own. And two of the most popular distros are Android and Ubuntu Touch. These are the fastest growing Linux-based operating systems where, world's best free and open source software made freely available on common platforms. These are developed by a huge and growing community, consisting Google co. and Canonical co. respectively. [1][4]

II. LITERATURE SURVEY

Even though some of the major mobile manufacturers had planned to minimize the monopolistic scenario, it's not getting perfect. Rather tearing down the situation, mobile manufacturers and developers are trying to erect new ones. Android, Nokia, Palm, and RIM are unveiling their own application stores over the net. The rapid growth and surmounting requirement for advanced mobile communication devices has triggered a mad competition among Communication and Information Technology corporations, like Apple, Blackberry, Palm, Microsoft and Nokia, to captivate the Lion's share of the industry. Surprisingly, Symbian, a London-based software developing company leads the market by about 50%, especially in PDAs and Smartphones. On 5th November, 2007, Open-Handset Alliance, a business alliance was established and which was led by Google with 50 members. Most of the significant major global mobile handset makers, mobile application developers, some mobile carriers and chip makers volunteered the alliance.

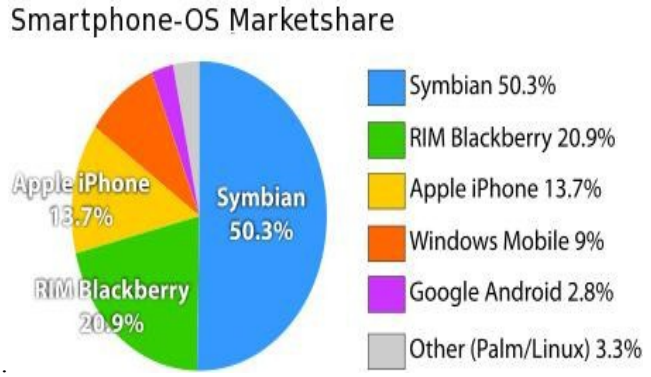

Fig. 1: - Pie diagram of the market shares occupied by the different mobile companies (year: - 2010)

It was named as Android. However, Android presents a mutual interest between all these companies to create a mobile operating system that is extremely viable and widespread so that it becomes easy to concentrate a business model around some sort of standard.

As an outcome of open standard, Android started to lead the charts.

III. OPEN SOURCE STANDARDS [1]

There are 10 core principles of open-source software: - Software must be free to redistribute. The program must include source code. The license must allow people to experiment with and redistribute modifications. Users have a right to know who is responsible for the software they are using. There should be no discrimination against any person or group. The license must not restrict anyone from making use of the program in a specific field. The license must not restrict other software. The license must be technology-neutral etc.

ISSN: 2278 – 7798

IV. ANDROID [9]

Android is a Linux-based operating system designed for touchscreen mobile devices such as Smartphones and tablet computers. Initially, developed by Android, Inc., to which Google backed financially and later purchased in 2005.

It is open source and Google releases the code under the Apache License. This open source code and permissive licensing allows the software to be freely modified and distributed by device manufacturers and enthusiast developers.

Android has a large community of developers writing applications that extend the functionality of devices, written primarily in a customized version of the Java programming language.

A. What standard does Android follow? [10]

The source code for Android is available under free and open source software licenses. Google publishes most of the code under the Apache License version 2.0. The Open Handset Alliance develops the changes to the Linux kernel, the rest of Android is developed in private by Google, with source code released publicly when a new version is released. Android has an active community of developers and enthusiasts who use the Android source code to develop and distribute their own modified versions of the operating system.

These community-developed releases often bring new features and updates to devices faster than through the official manufacturers. Community releases often come pre-rooted and contain modifications unsuitable for non-technical users, such as the ability to over clock or over/under volt the device's processor.

B. Features of Android

1. User friendly.
2. Open source code.
3. Millions of free applications.
4. Customizing easily.
5. Making own app is easy.

C. Current Scenario (Limitations of Android) [10]

No doubt about this, that the Android is dominating the market. According to the current picture approximately 70% of market shares are occupied by the Google incorporated OS.

But, along with its mass usage the malicious attacks on the applications used in this device are also increasing. For the instance, the Android OS suffers from virus attacks viz. Trojans, spywares, adwares, horses, worms etc. Some of the measure limitations of the Android are as follows

1. Vulnerable to Threats

Not a strong OS, it is vulnerable to threats. Android leads to lack of organization, sometimes there are malware and it may be vulnerability to viruses [11].

2. Memory Constraints

The OS does not clean the RAM automatically. It force closes apps if they are too large.

3. Awkward Design (Fragmentation)

It has lack of compatibility. It means that you have different phones running different versions of Android. It is decentralized and it lacks central Android body to address the grievance of its users.

4. Heat

Overheating of Android device has been a big issue and it has a very short battery life. If you use Wi-Fi connectivity for about an hour you can feel the heat in fuselage (back panel)

5. Crashes

Very unstable and often hangs or crash. When we try to multitask, the phone becomes slow. Complaints are made for app crashes and lags.

6. Little lag

There is a little lag in Android and it showed 'Play' button nearly after 30 seconds. In iOS the games opened just like a 1 KB text file.

7. As direct service providers, users sometimes very difficult to connect with the Google.

8. Wasteful Batteries, This is because the OS is a lot of "process" in the background causing the battery quickly drains.

9. You cannot off internet on it & so it updates some apps automatically & it results into shortage of phone memory.

10. Android is based on the JVM console (Java Virtual Machine). Having Ubuntu on the phone skips the need for a Java virtual machine to run the phone.

And these limitations have opened the doors for the new and emerging mobile OS viz. *Ubuntu Touch.*

V. UBUNTU [3]

Ubuntu is favorite open source operating systems with over 20 million users for computers and now Ubuntu is ready with their mobile Operating systems which will definitely going to give tough competition to its rivals Android and IOS.

The mobile version of Ubuntu is built around Google's Android OS and it promises to give the mobile experience of Android and the productivity of the Ubuntu desktop experience which is just a killer combination.

A. *Ubuntu Touch Concept*

Traditional Linux uses command-driven interface (or text-based interface). By adopting the X-Window technology, graphical user interface (GUI) is available for Linux. It may be Menu-driven or Icon-driven. Similar to Microsoft's Windows, however, different window systems can be chosen (e.g. GNOME, KDE etc.). A typical Linux GUI is based on GNOME. [3]

Modern mobile devices are already very powerful and therefore Linux which exists for nearly all modern hardware architectures can easily run on these devices. Only an existing user interface was not yet available to run Linux on these devices. Ubuntu touch can be able to fill this gap. Ubuntu Touch is in general a new Ubuntu distribution with a different UI that is adapted specifically to mobile devices with a touch-screen like phones and tablets. [9]

B. *What standard does Ubuntu follow?* [1] [3]

Ubuntu work is driven by a belief that software should be free and accessible to all. Ubuntu community believes that: Computer users should have the freedom to download, run, copy, distribute study, share, and change and improve their software for any purpose, without paying licensing fees. They should be able to use their software in the language of their choice and they should be able to use all software regardless of disability.

C. *Features of Ubuntu Touch*

* Fast, Fresh & Virus free *

1. Open Source [2]

Like android, Ubuntu is also an open source operating system. The benefit of open source is that it is typically much less resource-intensive, meaning that you can run it well even on older hardware. It's up to you–not some vendor–to decide when it's time to upgrade.

2. Cross Platform Compatibility [2]

Ubuntu for mobiles will another alternative to smart phones which are running latest android OS on their smart phones. It means you can install either Android or Ubuntu in your smart phones without any much hassle.

3. Memory Management [3]

The other advantage of Ubuntu over Android OS is that it uses less memory to run apps which mean better performance even for entry level smart phones.

4. Multitasking [6]

A swipe from the right edge takes you back to the last app you were using; another swipe takes you back to the app you used before that. It's natural to keep many apps open at once, which is why Ubuntu was designed for multitasking.

5. Integration [3]

Ubuntu Mobile OS completely integrates between the different computers, phones, tablets and TVs; a setup that even Apple could only dream about. The Linux-based software will allow users to run desktop apps on their Ubuntu handsets similar to desktops.

6. The other benefit of Ubuntu is that it uses the same drivers of Android and run smoothly on entry level smart phones.

7. Ubuntu will use native apps which mean developers can create single app for both computer and mobile operating system.

VI. PROFILING AND ANALYSIS

This section shows comparison with the performance of the Ubuntu touch with Android so it can be possible to figure out some more aspects and facts in the favour of Ubuntu Touch.

A. *Comparison of the Technologies* [8] [9]

The Android uses 2.6 version of Kernel whereas its counterpart uses 2.6.24 or higher version of the Kernel.

Android is based on the JVM console (Java Virtual Machine). This is the medium required to run the applications on the Android. But having Ubuntu on the phone skips the need for a Java virtual machine to run the phone.

It's a very strong OS; it is not vulnerable to threats. Because Ubuntu considers everything as a file (viz. Folders, processes, tasks, drivers & even files) and viruses attack on folders or equivalent not on the files. Whereas, in Android leads to lack of organization. Hence, it can be easily vulnerable to threats.

The Ubuntu and Android Os use different development platforms. They use Qt and Java respectively. Regarding Qt, it provides suitability for efficiently developing high-performance and user friendly applications with graphical user interfaces [12].

While the Java-based platform only manages to achieve comparable programmer efficiency to that of Qt platform it is clearly inferior when it comes to runtime and memory efficiency [12].

ISSN: 2278 – 7798

When it comes to the GUI libraries, the poor runtime-efficiency of Java programs is clearly evident, making the Java platform unsuitable for many GUI development efforts, even though the programming experience is comparable; Since Qt does not enforce particular programming [12].

Android force closes apps if they are too large. The phone itself has very little memory storage, so you have to keep large apps, videos, and photos on card. Whereas, Ubuntu Touch uses virtual memory technique. It stores all the paused applications on the secondary storage and only runs the current program on the RAM.

B. Performance Statistics

The performance of the above two OS are tested and compared on the following parameters,

1. Boot, Power off and Wake Times

This test is timed using a stopwatch that measures in milliseconds. I ran five iterations of each action in the following sequence: boot, Power off and wake. The clock for boot and wake times starts when the OS boot-loader takes over from BIOS operations. Boot timing ends when the operating system desktop appears, while wake timing ends when prompted to log in. Power off timing begins when the Power off command is issued and timing ends when the test system powers off.

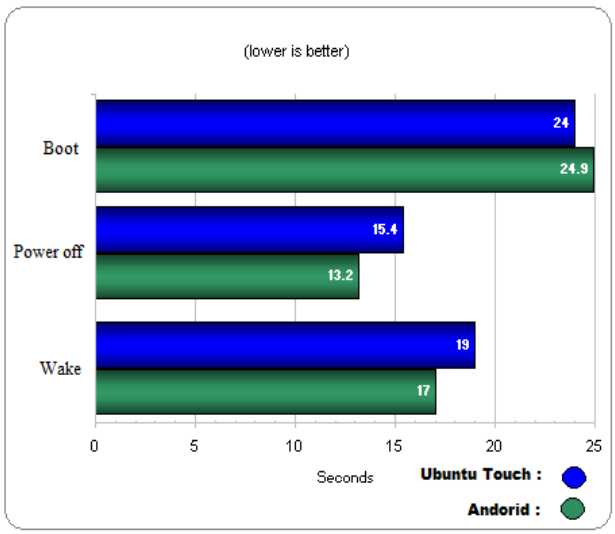

Fig. 2: - System boot comparison

Ubuntu Touch beats Android in boot time by about one second, but this Google owned doubles that lead over Linux in wake time. Android shuts down more than two seconds before Ubuntu. The overall winner here is Android, though not by a noticeable margin.

2. Multitasking

The 64-bit version of Blender 2.61 is used on both operating systems. The test file is the Blender Render Benchmark v0.2. Full-sample 16x anti-aliasing is enabled, and testing is performed using one, two, and four threads. I run two iterations of the Blender benchmark per thread.

Ubuntu has a slight (but noticeable) lead over Android in all three variations:

Four seconds using a single thread, three seconds with two threads, and two seconds with four threads.

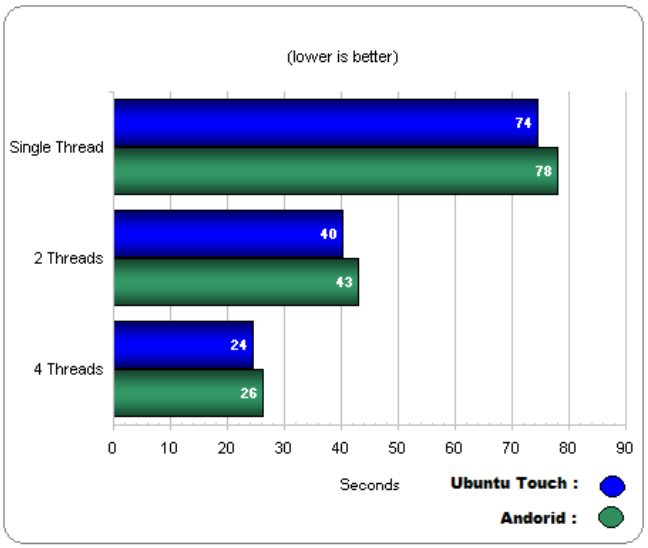

Fig. 4: - System executing the multiple threads

3. CPU & Memory

The 32-bit version of Geek-Bench 2.2.3 is used to evaluate both OS. Geek-Bench tests CPU and memory performance to produce a composite performance score. Ubuntu Touch slams Android in the Geek-Bench scores, beating the Google inc. operating system by nearly 1700 points

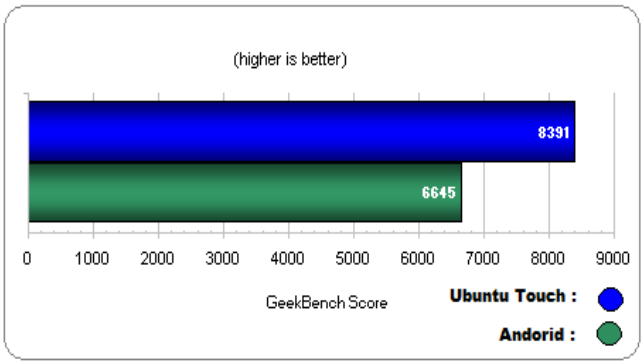

Fig.3: - CPU and Memory utilization

4. Video

Ubuntu has a slight (but noticeable) lead over Android in all three variations: four seconds using a single thread, three seconds with two threads, and two seconds with four threads.

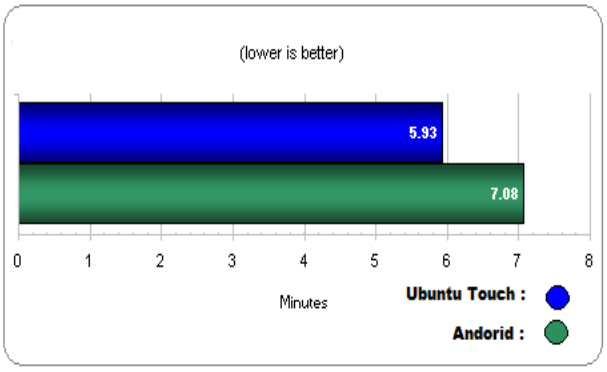

Fig. 5: - Video performance analysis

5. Audio

The input test file is a 542.1 MB wav, and the output bit-rate of the MP3 is set to 160. Only two iterations are needed.

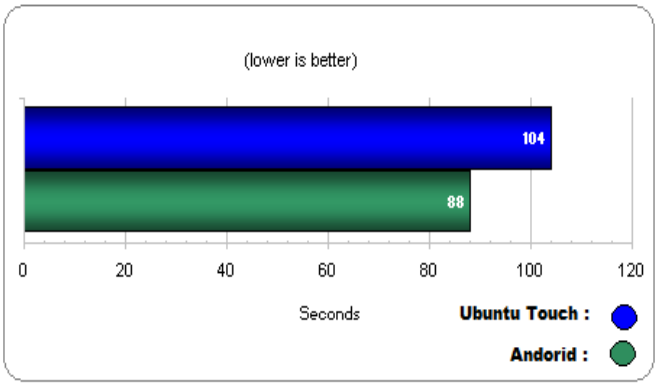

Fig. 6: - Analysis performance analysis

Android makes a comeback in audio encoding, beating Ubuntu by the same margins that Linux achieved in Hand-Brake.

6. Gaming

All games are run three times with full details enabled at a resolution of 1920x1080.

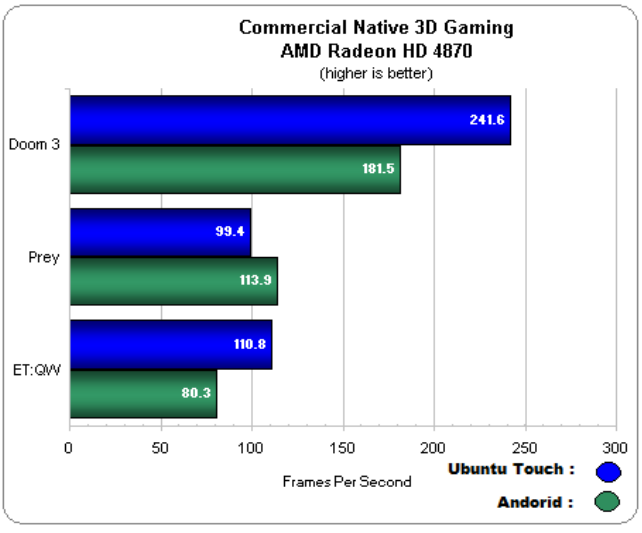

Fig. 6: - Gaming performances

The performance of Doom 3 in Ubuntu Touch is significantly higher than Android. The placing is reversed in Prey, as Android establishes a 14-frame lead over the opponent. Ubuntu fights back in Enemy Territory: Quake Wars with a 30 FPS advantage.

VII. FUTURE EXPANSION

Because of its dynamic nature Ubuntu has the biggest opportunity in the complete electronic market.

1. Ubuntu will use native apps [3]

Ubuntu Mobile OS will integrate between the different computers, phones, tablets and TVs.

The Linux-based software will allow users to run desktop apps on their Ubuntu handsets similar to desktop. It means developers can create single app for both computer and mobile operating system.

2. Your mobile will be your PC (& vice versa) [6]

If mobile would be connected to cross device then mobile would turn into your desktop PC.

VIII. CONCLUSION

As Ubuntu Touch OS is Linux based; hence source code is freely available. It considers everything as a file (even if it is a folder, process or drivers). Thus, the OS is completely virus proof and this gives the competitive advantage over Android and other OS. The code can be prepared using the simple C code and applications can be designed using Qt and QML softwares. Further, it can be dynamically modular, configurable and scalable and cross compatible and it optimizes the memory superbly.

REFERENCES

[1] White paper on: - "Mobile OS and efforts towards open standards" By Dotcom Info-way.

[2] Unity & Ayanta Architecture; Copyright© 2008, 09- 11; Documentation Project by; Neil patel & Ted Gould

[3] Ubuntu Mobile Guide; Copyright© 2004,05, 06 Canonical Ltd. and members of Ubuntu Documentation Project

[4] Linux (2008 Edition); Christopher Negus; published by:-Wiley Publishing, Inc.

[5] Beginning Linux Programming (4th Edition); Neil Matthew; published by:-Wiley Publishing, Inc.

[6] Buxton, W. (2002). Human Input to Computer Systems: Theories, Techniques and Technology.

[8] Jason Ansel, Kapil Arya, and Gene Cooperman. DMTCP: Transparent Checkpointing for Cluster Computations and the Desktop. In 23rd IEEE International Parallel and Distributed Processing Symposium, Rome, Italy, May 2009.

ISSN: 2278 – 7798

[9] "Android operating system"author Yaseer Ahmed Faraaz ahmed, in Aalim Muhammed salegh college of engineering.

[10]F. De Pellegrini, I. Carreras, D. Miorandi, I. Chlamtac, and C. Moiso. R-p2p: a data centric dtn middleware with interconnected throwboxes. In Autonomics '08, pages{10. ICST.}

[11]A. Vahdat and D. Becker. Epidemic routing for partially connected ad hoc networks. Technical report, Duke University, 2000.

[12] *An empirical comparison of C, C++, Java, Perl, Python, Rexx, and Tcl* by Lutz Prechelt, University of Karlsruhe.

BIOGRAPHIES

Asif Sardar Shaikh is the 2nd year M.E. student of Siddhant college of engineering. He is pursuing the degree in E&tc (VLSI & EMBEDDED) under the university of Pune.

Prof. M.U. Inamdar is the senior most faculty member in department of E & tc in Siddhant college of engineering. He has completed his degree in the digital electronics from Govt. College of engineering, Pune. He has the 24 years of experience in the same field.