Processing delays causes- Android vs. iOS for heavy apps

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ABSTRACT

Mobile operating systems are very lightweight so that the mobiles hardware can easily support the operating system and apps running on it. Some operating systems include additional features like sensor embedding and OTG aka On-The-Go. In this paper, we are going to focus on the performance of heavy applications running on both Android and iOS platforms and their processing delay causes. The performance testing is done with the help of a cloud testing platform i.e. bitbar.cloud. It is basically testing as a service provider which tests the Android and iOS applications with the help of simulated virtual mobile phones which uses Appcrawler and AI Testbot for testing these applications. The file packages need to be uploaded on the cloud platform which should be in the form of .apk and .ipa extension. The uploaded files are then tested by using either AI Testbot or Appcrawler by creating a new test in the Test Run Creator. With the results generated by these methods, we will compare the performance of these heavy applications on the different and their performance delays on the different devices and their underlying operating systems.

Keywords— iPhone, Android, iOS, bitbar.cloud, OTG, AI Testbot, Appcrawler

1. INTRODUCTION

Mobile Operating systems are defined as the interface that makes the interaction possible between the mobile hardware and the user with the help of operating systems. The operating systems support multitasking specialized input devices that are adopted by RIM for use in its handhelds, particularly the trackwheel, trackball and most recent the trackpad and touchscreen. The modern mobile operating system comprises of features like touchscreen, cellular, Wi-fi, GPS, navigation, personal mobile assistants, voice recorder, music player, video recorder/camera, Bluetooth, etc. The market is majorly occupied by two operating systems for mobiles viz., Android operating system and iOS. These operating systems are heavily dependent on the hardware provided by mobile manufacturers. The application we are targeting for testing is heavy applications whose performance are not only dependent on the operating system version but also on the underlying hardware like processing power, RAM, cache, internal storage, etc. These operating systems are elaborated below in detail.

1.1. History of mobile operating system

The first smartphone was the IBM Simon dated back in 1993 which supported certain features like touchscreen, Email and PDA features. In 1996, Palm Pilot 1000 introduced Palm OS with a personal digital assistant along with this the first Windows CE handled PC devices were also introduced. In 2000, Symbian became the first mobile operating system which was launched with the Ericsson R380. In 2002, Microsoft launches its first Pocket PC smartphones with Windows CE and BlackBerry released its first smartphone. 2007 became a benchmark in the history of smartphones as an Open Handset Alliance (OHA) was formed by Google,

HTC, Dell, Intel, Motorola, Samsung, LG, etc. Also, Apple iPhone launched iOS with iPod, "mobile phone" and "internet communicator". In 2008 OHA released its Android 1.0 operating system with HTC Dream as the first Android phone. In 2008, Samsung announces Bada OS with Samsung S8500. [2]

1.1.1 Android:
Android operating systems are Linux-based operating systems developed for mobile devices such as smartphones, tablet computers, PDA's and smart devices like smartwatches. According to Google's Andy Rubin, as of December 2011, there were approx. 700,000 Android devices activated every day. Android device's 58.6% usage share was acquired by Android Gingerbread (2.3.3) by February 2012. Onida unveils India's first Android Powered 3D TV 'itube'. Dropbox Android app update brings' automatic photo, video, document uploads. Also, it gives away 50 GB free cloud storage to all android users. Android development company is Google Inc. which initially released its first operating system on 20 September 2008. Android is programmed in C(core), Java, C++. Its latest stable release is Oreo 8.0-8.1 on 21st August 2017. [2]

1.1.2 iOS:
iOS was developed by Apple Inc. with its initial release on 02 September 2007 is an operating system which works on iPhone, iPad, iPod a mac book. In iOS we can't manage files and folders like Android.in this we have limited access because of security of app store. Each and every new version there are new features launched. Like in iOS 2 provided access to the app store which allows users to download third-party apps on the phones. iOS 3 added copy and paste functionality. iOS 4 was the OS which supports multitasking feature. Siri assistant was launched in iOS 5 version. As of October 4, 2011, Apple's App Store contained more than 500,000 iOS applications, which have collectively been downloaded more than 24 billion times (as per Canalys. Report on January 31, 2011). The iOS operating system is programmed in C, C++, and Objective C with an OS

family as Mac OS X, BSD, UNIX. Its latest stable release is 12.1 released on 30 October 2018. [2]

2. METHODOLOGY

The performance of applications depends on multiple aspects like the Memory onboard, RAM, processing power, operating system, as well as the application compatibility with the handset and the OS running on the underlying hardware. In this research paper, we are going to see the performances of the applications viz. PUBG, Shadow Fight 3, Asphalt, Modern Combat 5, Call of Duty, LIMBO and we will also compare media streaming on both the platform devices; also, we will see why these performances differ on the multiple devices with different platforms i.e. for iOS- Apple iPad Air A1474 10.2, Apple iPhone 5S A1453 11.2.6 and for Android- Google Pixel 9.0 -US, LG Google Nexus 5 6.0.1, LG Google Nexus 5 D820 5.0. We will be testing the above-mentioned applications on all these devices using bitbar.cloud testing platform with both AI Testbot and AppCrawler for Android and AppCrawler for iOS devices. For testing, we need the package files for both the platforms viz., .apk for Android and .ipa files for iOS. Then these application packages are uploaded onto the bitbar.cloud platform in the files library. Test Run Creator is used for creating new test cases and testing projects here user needs to select the targeted OS type as Android and iOS then user can select the framework that he/she needs the application to be tested with i.e. AppCrawler, AI Testbot where no additional file for testing is required there are more options like Android instrumentation, Calabash Android, Appium Android Server Side these testing methods needs additional test file with the .zip extinction. Then the application package file is selected from the Files Library which you need to test then there are custom settings which are optional like Project name, Test run name, language for the device, Test time-out period and so on.

Following these steps leads you to create a test for any number of devices for Android or iOS (the OS platform must be the same for testing the application on the devices). The test results are displayed in the project section of the website which includes which platform the application is tested upon and the test results show different performance results for all the devices the application is tested upon. These devices used are virtual devices which mount and installs the application packages on the devices virtually and run on the devices individually and virtually for performance testing. The results include the detailed reports of the tests done along with the snapshots while running the applications.

3. TEST ANALYSIS

Android and iOS devices are leading the mobile device market. While varied user experiences are reportable from the overall user community regarding their variations, like battery time period, display, and touchpad management, few in-depth reports are often found about their comparative performance running the popular heavy applications. The tests results for the particular application are as follows-

3.1. PUBG [7]

For this application, all the devices passed the tests during testing but some issues in some of the devices raised flags and promote some updates to fix the issues. However, there were fewer issues while running the application on the Android devices but the user experience was better on the iOS device as there was no application lag, and the application response was also better in iOS devices. The application can be best experienced on the iOS devices. [3]

Table 1: Issues found during testing of PUBG on multiple devices. [3]

Device	OS Version	Issues
Apple iPhone 5S A1453	11.2.6	Avg CPU usage during running step was 97.9%
Apple iPad Air A1474	10.2	Avg CPU usage during running step was 100.8%
Google Pixel -US	9.0	None
LG Google Nexus 5	6.0.1	None
LG Google Nexus 5 D820	5.0	Test run duration is 1.1 times as median

3.2. Asphalt [13]

For this application maximum issues were found while running on the iOS devices. Also, the issues were major issues. However, the application performed better while running on Android devices. Though there were some issues found the processing of the application was categorically smooth and with fewer glitches. [3]

Table 2: Issues found during testing of Asphalt on multiple devices [3]

Device	OS Version	Issues
Apple iPhone 5S A1453	11.2.6	Avg CPU usage during running step was 85.9%
Apple iPad Air A1474	10.2	Avg CPU usage during running step was 85.9%
Google Pixel -US	9.0	Device time is 1.1 times as median
LG Google Nexus 5	6.0.1	None
LG Google Nexus 5 D820	5.0	None

3.3. Shadow Fight [14]

This application can be best experienced on iOS devices though there were issues the application responded perfectly and the response of the application was smooth during run state. The issues are minor issues which did not hinder the performance of the application while running on the devices. On Android, the application run was successful and with fewer issues but the application response was comparatively slow and with a few crashes in 1 device. [3]

Table 3: Issues found during testing of SHADOW FIGHT on multiple devices. [3]

Device	OS Version	Issues
Apple iPhone 5S A1453	11.2.6	Avg CPU usage during running step was 58.9%
Apple iPad Air A1474	10.2	Avg CPU usage during running step was 57.4%
Google Pixel - US	9.0	None
LG Google Nexus 5	6.0.1	None
LG Google Nexus 5 D820	5.0	Device time is 1.1 times as median

3.4. Limbo [9]

This application runs well on both the devices but if we compare them Android comes out to be superior for this application as there are no minor or major issues found during testing and also there were zero crashes during the run of the application on the Android devices. The application response was also better on the

Android devices as there were no CPU lag or network issues while running the application. [3]

Table 4: Issues found during testing of LIMBO on multiple devices [3]

Device	OS Version	Issues
Apple iPhone 5S A1453	11.2.6	Avg CPU usage during running step was 50.8%
Apple iPad Air A1474	10.2	Avg CPU usage during running step was 51.6%
Google Pixel -US	9.0	None
LG Google Nexus 5	6.0.1	None
LG Google Nexus 5 D820	5.0	None

3.5. Call of Duty [10]

These application results are very versatile as this application fails in the test on iPhone 5S A1453 because of which there are no readings for CPU performance for the device. Also, there were 2 major issues found for the same device. The application runs successfully but with some time lag on Android devices but the application runs were successful and there were no issues generated during testing the application on Android devices. [3]

Table 5: Issues found during testing of Call of Duty on multiple devices. [3]

Device	OS Version	Issues
Apple iPhone 5S A1453	11.2.6	Test run duration is 1.1 times as median & device time is 1.2 as median
Apple iPad Air A1474	10.2	None
Google Pixel -US	9.0	None
LG Google Nexus 5	6.0.1	None
LG Google Nexus 5 D820	5.0	None

3.6. Modern Combat 5 [12]

This application runs best on Android devices as per the user experience even though there are no issues found in iOS devices but the application crashes as the CPU usage increases also there are a few test cases that fail in iOS devices. In Android devices, there are minor issues which are fixed in the higher versions of the OS. Also, the CPU usage is very high so the device shows the problem of device heating up. These issues can be figured out in the higher version of the application. As per the user experience, Android devices gives the best response while running the application. [3]

Table 6: Issues found during testing of MODERN COMBAT 5 on multiple devices. [3]

Device	OS Version	Issues
Apple iPhone 5S A1453	11.2.6	None
Apple iPad Air A1474	10.2	None
Google Pixel -US	9.0	Avg CPU usage during running step was 206.1%
LG Google Nexus 5	6.0.1	Avg CPU usage during running step was 165.7%
LG Google Nexus 5 D820	5.0	Avg CPU usage during running step was 155.9%

3.7. Media applications

The server-side workload has provided us with a high-level overview of different content requesting approaches of iOS and Android devices when accessing Internet streaming services as well as different amounts of traffic received, the workload cannot provide more details for us to explore the underlying reasons. Thus, during this section, we have a tendency to any investigate these observations victimization the progressive mechanical man and iOS devices. For iOS, because we cannot access its source code, we mainly conduct client-side experiments in a controlled environment to infer how it works by analysing the captured traffic. For a mechanical man, additionally, to the client-side experiments, we are able to get a better idea of how it works by accessing the source code of its media player. The client-side experiments are conducted in our workplace with a fervent 802.11 b/g access point (AP).

We use six different mobile devices running different mobile operating systems and different versions of the mobile OS. We use four completely different completely different iOS devices and a pair of different mechanical man devices. Note that though Kindle hearth uses a made-to-order version of the mechanical man, it uses identical media player framework as different mechanical man devices (including as we have a tendency toll as together with) the Nexus One we use in our experiments. In order to examine all the incoming and outgoing traffic to/from our testing devices, we set up Wireshark running on a laptop computer to listen on the same channel as the AP in promiscuous mode. Packets are captured in real-time and processed offline. [1]

Table 7: HTTP Request/Reply (number and traffic amount)[1]

HTTP 200		
Name	#Requests	Traffic Amount
iOS	0.01%	0.001%
Android	27.30%	80.594%

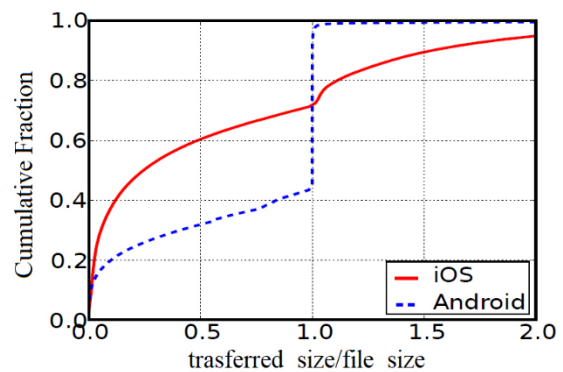| HTTP206		
Name	#Requests	Traffic Amount
iOS	99.99%	99.999%
Android	72.70%	19.406%

Fig 1: Ratio between received traffic and file size (CDF). [1]

4. CONCLUSION

In this paper, we performed multiple tests on various applications running on multiple devices having iOS and Android platforms. By analysing all these tests, we have concluded that there are comparatively more applications supporting Android platform than iOS. So, there were a few devices that did not support these tests. Considering the application package file size applications on Apple store have larger files than on the Google Play Store. While installing and running the applications the average waiting time for the applications is lesser in iOS devices but the preparation time for

installation of the file is less in Android devices. The average device response time for Android devices is lesser which makes Android devices better for user experience and application response. But as we talk about the OS and hardware for the devices the iPhones have embedded programs to handle the running of the device hardware so the cache is fully empty to be used by the applications to run smoothly this is why the devices fast and the user experience for applications is better on the iOS devices. Whereas the Android devices need to load the data into the cache first and then run the hardware from that so this limits the usage of the full power of the underlying hardware. We also found that the user experience for the applications is better on the iOS devices than on Android devices as the applications performances were smooth even though there were a few issues detected but that did not hinder the performance of the devices in iOS. Further to conclude, we would recommend iOS devices for better user experience but if the user intends to explore more and have a thorough experience in mobile devices then Android-powered devices are recommended as it is an open source so there is no limitation to use the devices to its full power.

5. ACKNOWLEDGEMENT

6. REFERENCES

[1] A Comparative Study of Android and iOS for Accessing Internet Streaming Services.

[2] Mobile Operating Systems- Slide Share

[3] BitBar.Cloud
https://cloud.testdroid.com/#testing/projects/193805565

[4] "Mobile/Tablet OS Market Share," http://marketshare.hitslink.com/operating-system-market-share.aspx?qprid=8&qpcustomd=1.

[5] Y. Liu, L. Guo, F. Li, and S. Chen, "An Empirical Evaluation of Battery Power Consumption for Streaming Data Transmission to Mobile Devices," in Proc. of ACM Multimedia, 2011.

[6] "Wireshark," http://www.wireshark.org

[7] A. Rao, A. Legout, Y.-S. Lim, D. Towsley, C. Barakat, and W. Dabbous, "Network Characteristics of Video Streaming Traffic," in Proc. of ACM Co Next, 2011.

[8] https://chambergames.files.wordpress.com/2007/10/limbo.pdf

[9] https://www.slideshare.net/blackopsandroid42/call-of-duty-black-ops-3-android-pdf 2011.

[10] J. Erman, A. Gerber, K.K. Ramakrishnan, S. Sen, and O. Spats check, "Over The Top Video:

[11] The Gorilla in Cellular Networks," in Proc. of ACM IMC, 2011.

[12] https://booksmango.com/wp-content/uploads/2016/01/Modern-Combat-5-Guide-Preview.pdf

[13] https://www.vivendi.com/wp-content/uploads/2018/06/Asphalt-9-Legends_Announce_040618_EN.pdf

[14] http://shadowfight3.com/downloads/pdf/en/Shadow_Fight_3_Launch.pdf

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