Wireless Mobile communication: Tools and Techniques

Dr. K B Priya Iyer [1], Pooja S[2]
[1]Associate Professor, [2]Student - M.Sc. Information Technology
Department of Computer Science
M.O.P. Vaishnav College for women (Autonomous), Chennai, India
Email - [1] priya_balu2002@yahoo.co.in , [2] poojapooju595@gmail.com

Abstract: *Mobile app testing is a method of testing applications developed for hand held devices. It is the process of checking the application for functionality, usability and performance issues. It is different from testing of desktop applications, from regular functional and UI requirements we also have to consider factors like device hardware, screen size, platform, connectivity issues and many more. The main objective of this paper is to bring out the relevant issues of the mobile application testing and the tools to remove them. For this paper, we have discussed a set of tools, and compared between different platforms which are raised to test the appropriate issue problems. This paper discuss techniques of software testing on mobile apps.*

Keywords: *Software Mobile Testing; Software Testing; Mobile Performance Testing; Mobile Application Tools.*

1. INTRODUCTION:

Mobile applications become unexpected when adopted by individuals and organizations to organize and manage almost every single life activity [1, 2, and 3]. We have seen a rapid improvement in cellular technology in recent years in terms of smart phones [4].The importance of testing these applications is appeared for both privacy and security resolves . One of the main challenges of testing a mobile is the high cost and availability of devices. Goal of this work is to provide an answer to those research questions. This paper first analyse what a mobile application is or is going to? It specified that developers are more focusing on the application back end and functionality rather than use experiences. In fact, a user feedback is one of the fundamental parts of application's reputation to ensure app's owners with successful or failure of their application [20].This paper inspires on nine Mobile application testing tools Commonly, users can easily drop interesting in problematic mobile app, and will abandon it after only one or two failed attempts. The rest of this paper is organized as follows. SectionIII provides an overview of Mobile application, Section IV mobile application testing scope and types. SectionV gives a brief description about mobile application Requirement And Features, SectionVI Mobile application testing strategies. SectionVII Experiment&comparisons of tools are described. We conclude the paper in SectionVIII.

2. LITERATURE REVIEW:

Pallavi Bhuarya1 Shruti Nupur2, Anuradha Chatterjee3, Rajesh Singh Thakur4[1], presents an overview of *Mobile Application Testing: Tools & Challenges* important research issues related to the development of applications that run on mobile devices.

Henry Muccini [2], presents the main Challenges in the field of mobile application testing for the Android stage, with an importance on advances in the field. Also present suitable and actual, principles strategies, prototypes, procedures, and tools for Mobile application testing and conclude with an outline of Future Research Directions"

MohammedAkour [3] present standards for selecting mobile application testing tools based on*: Thoughts, Strategies, Challenges, and Experimental Study* Also presents the idea for a modest and faster way of selecting the applicable tool for testing mobile applications.

Laura Naismith, Mike Sharples, Giasemi Vavoula, Peter Lonsdale [7]- provides an collected works on testing of mobile applications, dares in mobile application testing and research directions

PRELIMINARY INSPECTION:

The paper addresses the following four research questions:
1) Are mobile applications different than familiar software's?
2) What are the types and characteristics of mobile applications?
3) What are the scopes, types, and strategies of mobile application testing?
4) To which extent virtual device can emulate a complete client experience?

A. What is a mobile application?

Mobile applications is a software designed and implemented to run on smart phones, tablet computers, and other mobile devices with operable graphical user interface (GUI) to perform certain tasks. They are rapidly

developing segment of the global mobile market and can be downloaded through USB / WIFI or can be downloaded by a web server over internet [1, 7, and 8] It is necessary to separate mobile applications from the traditional ones. While the mobile applications are designed and implemented to support devices, the traditional ones are more likely implemented to run on desktop computers. The former is also aware of the environment in which it runs and adjusts according to its computing, user, physical, or time context which is known as context awareness computing. Thus, mobile applications require specialized and different testing technologies There are mainly three types of mobile applications: mobile apps, mobile web applications and hybrid mobile applications. Mobile apps, known also as App4Mobile[1], are native mobile applications installed and executed on mobile devices with limited resources and driven by user inputs. These applications usually depend on native mobile API "Application Programming Interface" and dongles on mobile devices such as camera [1]. This kind of application can be seen as offline application which could be run and used without need of Internet connection driven by user This type of applications is built for a specific platform with the platform software development kit (SDK) tool Since mobile devices are almost always logged in to the mobile network, it makes mobile applications always connected. The mobile network may vary in speed, reliability and security.

B. Mobile Applications Testing Scopes And Types:

When testing process is complicated for several reasons such as high dynamic in the mobile phone manufacturing world, frequently updating software, and lack of unified supporting test operations where each application has its own unique business and data flow. It is a well- defined software test methods and tools. Mobile applications are getting more and more complex, which make testing their stability and robustness [13] is necessary. Testing mobile applications can be done using different approaches for different objectives such as hardware compatibility, software reliability, application functionality etc. Some testing mobile application purposes are summarized as

- Mobile function and behavior testing: It checks the authority of mobile functions and behavior under all possible situations
- Mobile system QoS testing: checks the mobile application scalability and its ability to handle a growing amount of work in a capable manner , reliability, regularity , availability ,instant connectivity & operation, and performance.
- Mobile interoperability testing (compatibility): checks the mobile application crossing different platforms to make sure that the application is well-matched with other applications and supports cross-use functionality.
- Mobile usability and internationalization testing: It reviews the design and development of software or Web applications to make sure that it can be easily adapted to various programming languages.it reduces time and cost of getting a product to international markets and enables localization of the product in a specific market. Usability includes text visibility on the selected language, navigation between screens, and functionality of online/offline.
- Mobile security testing: regarding the privacy of personal and business stored information on mobile devices include inscription/decryption techniques used for sensitive data. Attacking security may come from means of communication like SMS, MMS, WiFi, and Bluetooth, or may exploit software vulnerabilities from both the web browser and operating system.

3. MOBILE APPLICATIONS TESTING REQUIREMENT AND FEATURES:

We are moving from a PC society to a mobile society,Test process should consider mobile context 85% of professionals not using test process designed for mobile applications. where more processes are done by mobile devices, and more personal and business information is stored and accessed from these devices.

- Testing anytime and anywhere: mobile applications are available at anytime and anywhere; therefore mobile application function should be correct anytime and anywhere
- Testing for good and rich mobile experiences: mobile applications are designed and developed to support high experienced users by providing multiple input channels, rich media features, native application interfaces, and hardware equipment.
- Testing junction mobile platforms and browsers on variety of mobile devices: mobile devices have different operating systems; display scopes, hardware appliances, and battery operation time.Therefore testing mobile applications must be directed on selected device with a different mobile platform.
- Testing using large-scale mobile simulation and virtualization: this is required to calculate mobile application performance and scalability so that hardware costs can be reduced.
- Testing with divers network connectivity: mobile applications must be validated under different network connectivity and related contexts, because mobile devices support various wireless network connectivity (such as 3G, Wi-Fi, and Wi- Max).

4. MOBILE APPLICATION TEST STRATEGY:

Mobile application testing represents many techniques and tools to meet quality requirement. One of these orderings is based on the original client and server organization.

Device Break-up: - Mobile device fragmentation can be a problem for software developers who must create different versions of the same app in order to make sure it works correctly with different versions of a given OS. There are different mobile OS available. Major ones are Android, iOS, and Windows Phone.

When developing the test, come across differences in the way your app performs between platforms. Using a setting that supports multiple objects can help because it permits to isolate the functionality of a specific object and determine whether it needs to be improved for other platforms or not. instance your app may have a selection menu that needs to present as a scrolling list for Android and a radio-button selection list for Windows Phone. With a testing solution that supports multiple objects, one can easily test both the scenarios.

Network Range: Apart from the hardware and software issues, the performance of carrier's network also affects the functionality of your application. The application should be able to work in 3G, 4G or 5G network, low signal strength and different wifi speeds. Some applications are expected to work the same in no-network or offline condition [10].

Collection of right tool: As we know one size doesn't fit all. Though there are variety of tools available for mobile testing selecting the right tool may be problematic. Tool has mock-ups and need to be altering the business need. For instance some open source tool has limitations like no image comparison, slow script comparison for the iOS platform.

Unbroken Testing: Continuous testing is a way to implement test as a part of software delivery pipeline to receive an direct feedback. It redefines your application and adds a lot of new sizes. Once you add a change, you need to perform regression testing from the beginning to ensure application compatibility.

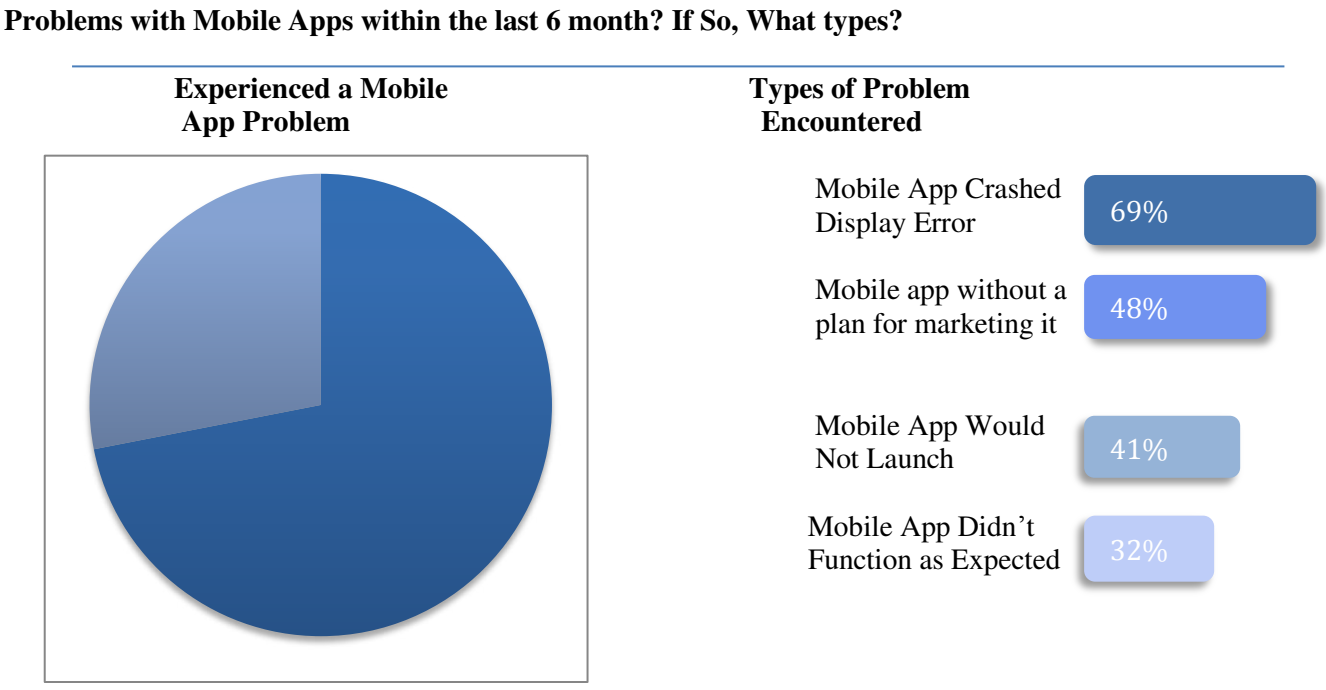

Fig 1.1

In Fig 1.1 There are various Problems in Mobile Apps Within Last 6 months, Maximum Amount

5. TOOLS:

There are various types of Mobile apps tools present in the software market to test your application. One of them is based on your requirements and type of Mobile Application testing.

MonkeyTalk:

MonkeyTalk is an open source tool for Android and iOS. It is used by both tester and developer. MonkeyTalk have a two main work: MonkeyTalk IDE and MonkeyTalk Agent.IDE is that tool which records, plays, edits and

manages functions test suits for application running on devices. It permits record & play MonkeyTalk commands and based on commands, it performs a user-interface action / verification test to those mobile apps.

Frank:

Frank is an iOS only test framework merging JSON and Cucumber .It allows us to write mechanical approval test which verify the functionality of our native iOS application. Frank has a powerful app inspector called Symbiote that is used to get detailed information on our running app

Calabash:

Calabash, which is considered as Behavior-Driven Development (BDD) test computerization framework, means basically a viewpoint of outside-in development. It's theoretically similar to Test-Driven Development, but takes it one step further, in that instead of creating tests that describe the shape of APIs, application behaviors are specified. Calabash consists of two open source libraries, one for iOS and other for Android.

Calabash can be compared with Xamarin Web Driver. It is used to perform a Automatic Functional Testing for mobile native apps. It may provide the APIs that are skilled to native apps running on touch screen devices. It works well with Ruby, Java, NET, Flex and many other programming languages. It is developed and maintained by Xamarin and can be run on Xamarin Test Cloud. It also supports Cucumber. It can be used with any Ruby-based test framework. Calabash is currently at version 0.5.4.

Appium Studio:

Appium is an Open-Cause tool for automation of built-in, mobile and web as well as hybrid apps on iOS and Android platform. It is good for apps those are written in Android or iOS. Appium supports Safari on iOS and all other built-in browser apps on Android. It need to adapt any app code for testing as it is run on Android & iOS using the device or emulator. This tool is used for Functional Testing of mobile apps. It is really easy to set up and works on the Selenium Web Driver API that requires a client-server protocol called JSON Wire

Silk Mobile:

Silk Mobile is an mechanise app Testing tool developed by Borland. This tool is used For testing a real-time devices and mobile host(hardware/software). It supports testing on Android, iOS, BlackBerry, Windows Mobile, Symbian, and HTML5, which Supports both open-source and commercial environment. Silk Mobile enables you to test in a way which duplicates the real end user experience.

Without the need to jailbreak, real devices and gestures which include drag and drop, zoom, script and multi-touch. Use graphical scripting or progressive scripting in your chosen language to strictly support your organization's needs. Advanced object recognition safeguards trustworthy and robust mobile testing, though reducing the maintenance costs of your test pack. latest version of silk mobile was Introduction a Silk WebDriver on 2017 with free derivative of Silk Test for recording and replaying Selenium scripts.

Hockey App:

It is a cross-platform tool works with a developer to distribute better versions of iOS, Android, Windows Phone and Mac OS. HockeyApp was launched in 2012. It was acquired by Microsoft in 2014 Crunchbase 01.business existed in certain form in 2011 with Microsoft as a customer HockeyApp 05. Microsoft acquired HockeyApp, which had already become a known tool among app developers consolidated distribution across all platforms for handling updates.

Crash Reports & analysis can be combined with version control. Microsoft has scheduled with open source software development kits, making it possible for your apps to send crash reports openly from your app to HockeyApp without writing any single line of code. They can also use the feedback feature to report bugs, recommend features and ask for support. It is very easy to mix with any app that you're developing, and it provides rich analysis into crash reports. It's also very easy to integrate with bug tracking systems and workflows already in use.

Ranorex:

Ranorex Tool provides test mechanisation for multiple environments, devices and software applications. Object built a record & replay, using Ranorex Recorder, which records the user's communication with a desktop, web based application are create user supportable scripts that can be edited with the Ranorex Studio. They reduce test maintenance and offer complete flexibility.

It offers a mapping between the user interface elements of the tested application and the testing framework. With seamless integration of Ranorex into existing environments and finds bug more quickly and make testing more trustworthy. **Ranorex Parallel Runner,** which supports running tests across multiple capability sets on a Selenium Grid through WebDriver endpoints in parallel. Start functional test automation in teams that include both testers and developers.

Test Complete Mobile:

TestComplete Mobile is a mobile application testing platform from SmartBear. It also helps to create & run frequent and hard UI tests across native or hybrid mobile apps. The tester is able to run tests across various devices with different & changeable screen sizes and resolutions. Moreovhi howru am fine wat r u doing er, it facilitates complete access to mobile device sensor data, namely GPS, accelerometers, and gyroscopes.

eggplant:

eggplant is a Commercial GUI Automation Testing product designed and developed by TestPlant used for Android and iOS app that helps teams get software products to market faster, with higher quality, less effort, and clearer traceability and it is named as eggOn. It is useful for UI Computerization and well-designed, Image-Based Testing, Mobile Testing, network Testing, Web Testing and Cross-Browser Testing. It is a Full device code are some additional features of this tool and also there is no need of any single change in the app code to test the app **.**Over unique technologies, this tools combines power, simplicity & flexibility that any tester can be productive. From mobile to desktop to mainframe, from efficient testing atmosphere management, where it brings a testing to live monitoring, from media to security attack to business services, eggplant test tools can help any team improve their throughput and worth.

1. Comparisons of Tools between different platforms:

Tools/ Feature	Monkey Talk	Frank	Calabash	Appium	Silk Mobile	Hockey App	Ranorex	eggplant
Support of devices	Android and ios	ios	Android and ios	Android and ios	Windows Symbian& HTML5	Android, iOS, Mac OS	ios	Android and ios
Ease Of Usage	Yes	Yes	No	Need Code	yes	Need Code	No	Yes
Integration with test management	Quality Center	possible	Not Possible	Quality Center	In-build For Tool test manager	Not possible	Quality Center	Quality Center
Scripting language supported	Javascript Monkey Talk	Ruby	Ruby,C#,Jvm	Java,PHP,Python Javascript,Ruby	Java/.Net	C, Swift, Java,	C#,VB Script .Net	Sense Talk, Java, C#, Ruby
JailBreaking / routing	Needs to jail break	Needs to jail break	Needs to jail break	No need to jail break	No need to Jail break	Needs Jail break	No need to jail break	Needs Jail break
Authorizing	Subscription based	Free	Free	Profile Share	Subscription based	Free	Profile Share	Free

6. CONCLUSION:

We are living in a growing world where each day brings new modifications and updates in mobile manufacturing sector in different shapes either in software development, OS, or hardware. Mobile application testing remains challenging task in the modern industry. The aim is to stress the real time trials faced in mobile testing. Testing is done in different ways as mentioned through different tools. Moreover, it is difficult decision for the test engineers to decide about the automation or manual testing. Appium and Calabash are the best tools which makes Testers Easy debugging. Appium and Calabash uses WebDriver API which can be used with any HTTP client Solutions that may enable cost-effective testing of mobile applications include outsourcing, cloud- and crow-based. This paper explodes the spark of new researchers to understand the complexity and testing techniques of mobile application. As a future work we intend to investigate the problem of multiplicity of testing methods and strategies by following a “hardware/software compatibility approach” which decisions regarding to the quality of that software are made.

REFERENCES:

1. Henry Muccini Department of Information "Software Testing of Mobile Applications:
2. Challenges and Future Research Directions" University of L'Aquila, Italy henry.muccini@di.univaq.it
3. MohammedAkour, Antonio Di Francesco, Patrizio Esposito Mobile Software Testing: Thoughts, Strategies, Challenges, and Experimental Study. International Journal of Advanced Computer Science and Applications, Vol. 7, No. 6, 2016
4. Amer S. Alharthi KACST aharthi@kacst.edu.sa
5. Software Testing of Mobile Applications:"Challenges and Future Research Directions". ISBN: 978-0-9891305-4-7 ©2014 SDIWC
6. Triin Samuel : UNIVERSITY OF TARTU Institute of Computer Science - Software Testing-Problems and solutions in mobile application testing. Tartu 2016
7. M. Justin Rajasekaran: Challenges in Mobile Application Testing: A Survey I J C T A, 9(27), 2016, pp. 159-163 © International Science Press
8. Literature Review in Mobile Technologies and Learning Laura Naismith, Mike Sharples, Giasemi Vavoula, Peter Lonsdale. 23 Nov 2017
9. Meiyappan Nagappan March 2016 DOI: 10.1109/SANER.2016.88 Department of Software Engineering Rochester Institute of Technology Rochester, NY, USA mei@se.rit.edu.
10. Mobile Application Testing: Tools & Challenges