Mobile Application Testing: Tools & Challenges

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Abstract: Software Testing is a process of detecting errors while executing a program so that we get a zero defect software. The aim of this paper is to evaluate and establish a comprehensive view of the field of software testing. The main objective of this paper is to bring out the relevant issues of the mobile application testing and the tools to remove them. There are many tools available in the market at the moment, each having its own features to test software. For this paper, we have discussed a set of tools, which are constructed to tackle the appropriate topic problems. Software testing is a crucial area of research and a lot of development has been made. We did not mean to give a complete overview of the mobile application testing field- challenges and methodologies, rather we intended to show an overview of the tools which are meant to overcome the challenges of the software testing.

Keywords: Mobile application testing, automated tools, testing, testing challenges.

1. INTRODUCTION:

The growing use of Smartphone, tablets, wearable, and other mobile device has accelerated the development of mobile application to a great extent .Nowadays mobile applications are used for personal and professional interactions such as shopping, banking etc. Hence testing an application is crucial activity to be performed to check all the features before it is deployed. An efficient strategy is required to check whether the application is covering customer expectation and business objectives. Mobile application testing is a process by which application software developed for handheld devices is tested for its functionality, usability and consistency [1]. It is generally a complex process because of the diversity of devices, platforms, screen resolutions, memory capacity, connectivity options and many more. Testers have 48% uses to ensure the compatibility of the application with all such given features [2]. Android and iOS are the most prevalent operating system in today's era.

1.1 Why testing is required?

According to a survey 48% of users won't use an app again after encountering a major issue. If your app has bugs and issues and if it often crashes, you will get poor ratings and annoying comments by the user which will consequently lead to less downloads that will result in fewer revenues. The only way to achieve good ratings and positive reviews is to test your application efficiently. The quality of an app is even more important than its functionality and its design.

With a view of keeping the sensitive contents of the application protected from unauthorized attack you need to do security test before the app is employed. Also an application must be tested for its functionality.

1.2 Types of testing: There are two types of testing available-

1.2.1 Manual testing: It involves a lot of efforts as it operated by human beings manually to find defects using a test plan which describes a systematic and detailed approach to test software. It consumes more time and is not suitable for large projects. It is measured in person per month [3].

1.2.2 Automated testing: The efforts in manual testing can be reduced by automated testing. Here tools execute a pre defined scripted test on software to detect bugs and errors. It is an effective and efficient method as it saves time and money. It is most suitable in environment where there is instability in requirements and regression test is required to perform iteratively. There are several tools available to meet the requirement [4].

2. TOOLS:

There are various types of automated tools present in the software market to test your application. Selecting one of them is based on your requirements and type of test like GUI based. Some popular testing tools are discussed below-

Appium: Appium is an open source project for cross platform test automation .It is an http server which manages WebDriver sessions and support test in any framework that can create an HTTP request whether on iOS or android, any test can be performed. Appium supports Safari on iOS and chrome on Android [5] [7].

Calabash: Calabash consists of two open source libraries, one for iOS and other for Android. This results in automated testing for native or hybrid mobile applications. Calabash is maintained by Xamarin and used with Cucumber, to translate the cases written in natural languages to test script so that they run within the framework. It provides APIs that are skilled to native apps running on touch screen devices [5] [7].

Frank: Frank is an iOS only test framework combining JSON and Cucumber .It allows us to write automated acceptance 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 [5] [7].

MonkeyTalk: MonkeyTalk is an open source Automation tool for Android and iOS. It is used by both tester and developer. MonkeyTalk consist of two primary components: MonkeyTalk IDE and MonkeyTalk Agent.IDE is that tool which records, plays, edits and manages functions test suits for application running on devices. Agents are libraries that must be linked into application to be tested [6].

Robotium: Robotium is a test framework created solemnly for the testing of the android Application. It makes it easy to write powerful and robust Automatic black box test for Android with the help of Robotium. Test case developer can write function, system acceptance test scenarios multiple activities. A free extension library called ExSolo adds abilities like multi path dragging [5] [7].

2.1 Comparisons of Tools between different platforms:

Tool	iOS	Android
Appium	Yes	No
Robotium	No	Yes
MonkeyTalk	Yes	Yes

3. KEY CHALLENGES OF TESTING:

With an emerging technology developing and implementing mobile application can posses a number of unique challenges. Few are described below:

1. **Device Fragmentation:-** Mobile device fragmentation is a phenomenon that occurs when some mobile users are running older version of an OS, while newer versions are available. There are different mobile OS available. Major ones are Android, iOS, and Windows Phone. When developing the test, you will come across differences in the way your app performs between platforms[8].Using a framework that supports multiple objects can help because it enables to isolate the functionality of a specific object and determine whether it needs to be altered for other platforms or not. For 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 [9].

2. **Network Diversity:** 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].

3. **Selection 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 imitations and need to be customizing the business need. For instance some open source tool has limitations like no image comparison, slow script comparison for the iOS platform etc [10].

4. **Need of Specialized Skills:** The tester should be skilled enough to test the application with his testing resources. A tester must go beyond the traditional role and collaborate with the marketing team and business analyst to determine what parts of application require special attention and test accordingly [11].

5. **Continuous Testing:** Continuous testing is a way to execute test as a part of software delivery pipeline to receive an immediate feedback. It redefines your application and adds a lot of new builds. Once you add a change, you need to perform regression testing from the beginning to ensure application compatibility [12].

4. CONCLUSION:

Mobile application testing evaluates difference between expected and actual results. Software test automation makes use of specialized tools to control the execution of tests and to make the app more efficient, secure and consistent.

5. FUTURE SCOPE:

There is always a room for improvement. Despite he plethora of   test framework available, testing tools continues to be developed at a rapid pace with developing mobile application. Each framework has its own pros and cons which should be measured relative to the requirements of the software product. It is better to choose a tool which increases automation, have excellent support and cost efficient. Hence a lot of research can be done in his area to find solutions for the challenges.

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