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Comparative Study on Different Mobile Application Frameworks

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Abstract – *Software Testing is essential to deliver the best application we can, many companies spend more time and resources to ensure that the application is tested completely. One of the most evolving areas in software development is Mobile application development. Hence, there is a lot of implication for the mobile application testing currently. In order to advance with this, there are a number of tools available predominantly for iOS and Android. Since Testing is an iterative process no one would opt for Manual Testing, Hence the need for automation arises. Here in this paper we discuss various platforms and frameworks of mobile application testing such as Robotium, Appium, MonkeyTalk, Espresso, Calabash and UI Automator with their features and other characteristics which helps us to get a clear picture of advantages among them.*

Key Words: Software testing, Mobile application Testing, Robotium, Appium, Espresso, Calabash, UI Automator.

INTRODUCTION

The process by which the developed application for mobile devices is tested for its uniformity, functionality and usability is branded as Mobile application testing [1] .It can either be done manually or through automation. The greatest hurdle is not just to build the applications but to guarantee their effectiveness and stability. This cannot be achieved through manual testing. Hence, testers prefer Automation testing methodologies [2].

Framework plays a major role in determining how to organize the automation project in order to maximize results. It helps in understanding as to what, where, how and when to implement the factors needed for automation. It is a technical implementation guideline, as well as the managerial part [3]. Since one of the vital object for the automated testing process to be precise is to find the correct test framework, all the Test Automation Frameworks should be studied extensively before deploying it for a particular mobile application [2]. Currently there are numerous frameworks available for mobile application testing, out of which a few are discussed in this paper.

Different frameworks used in Mobile App. Testing

1) Robotium:

- Robotium is an Open source framework for android testing which uses Java and JUNIT.
- Black box test testing helps to automate user interactions with the exception of web or flash apps, like text entry , clicking , touching and any other gesture possible on a touch device
- Mobile web, native and hybrid apps testing can be done in this framework.
- It is an open source community which has a release every month
- Function, System and Acceptance test scenarios can be created easily with Robotium [7]

2) Espresso:

- Espresso is implemented on Android Instrumentation Framework. It is small API that is supported on API level such as 8 (Froyo), 10 (Gingerbread), and 15 (Ice Cream Sandwich). It is fairly a simple Automation tool.
- It synchronizes with UI thread and hence this makes it more reliable. It does not require sleeps. When the app becomes idle the tests are executed on the same millisecond.
- Web views are not supported.
- It is the most recent Framework that was launched by Google and it's open-sourced. This makes it available easily for the developers and testers [5].

3) Calabash:

- For Native iOS, native Android and mobile web, Calabash is the best Behavior driven test framework.
- During runtime, the test which is described in cucumber is automatically converted into Robotium or frank.
- New commands can be added in Calabash through Ruby or Java Apart from the default 80 commands which are already present.
- The command line inspector in Calabash tool assists in finding the correct UI ids/element names [4].

4) UI Automator:

- This testing framework works only on Android API level 16 and above and is provided by Google's Android.
- The main purpose of automating the UI test with Android Studio is to device the test code into a distinct Android test folder where the code is used to achieve testing tasks and to simulate user interaction on the target app.
- Though this framework is simple and is easy in handling the asynchronous events like alerts, dialog and Toasts; its usage is restricted only for Android version 4.1 [6].

5) Appium:

- Test can be done in multiple platforms
- Helps in automating Native app, Mobile app and Hybrid apps on both iOS and android platforms.
- Simulators (iOS, FireFoxOS), Emulators (Android), real devices (iOS, Android, FireFoxOS) can be tested in Appium.
- Any programming language can be used which are available in web driver library [6].

Table -1: Comparison of frameworks [4, 5]

Features	Robotium	Espresso	Calabash	UI Automator	Appium
Android	Yes	Yes	Yes	Yes	Yes
iOS	No	No	Yes	No	Yes
Mobile web	Yes	No	Yes	Limited to x,y clicks	Yes
Scripting Language	Java	Java	Ruby	Java	Almost any
Supported API levels	All	8, 10, 15-19	All	>=16	All
Test creation tools	Testroid recorder	Hierarchy viewer	CLI	UI Automator viewer	Appium.app
Community Support	Contributors	Google	Limited	Google	Active
Parallel Execution	No	Yes	No	Yes	Yes
License	Open Source	Open Source	Open Source	Open Source	Open Source

Here we see how table 1 illustrates a brief comparison of all the frameworks that are discussed in this paper. Where based on few specific parameters comparison is been carried out, which helps us to judge on which framework suits for the kind of testing that we are targeting to implement.

CONCLUSIONS:

As we have discussed the need for mobile app. testing automation, to compete in market and to give sustainable solution to the end user, choosing and applying best framework for app. Testing is one of the major part of our testing process. In this paper, we have outlined the different automation frameworks that can be used for different types of testing by comparing different frameworks based on some parameters. Hence through this comparative study we can conclude that compared to other automation tools, Appium stands out in terms of platform independence, support for hybrid and web applications and supports various languages such as Ruby, Python and C#.

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