Mobile Application Testing – Problem areas and Strategic Solutions.

[1] Sreenivasa Murthy.V,[2] Dr. Sudhamani
[1] Research Scholar,Rayalaseema University
[2] Research Supervisor, Principal, Vivekananda Degree College for women.
Mahalakshmi Layout, Bangalore.

Abstract: In today's real-world scenario, meeting the requirements of software to be fully functional on various devices has been difficult since there are multiple variants in mobile devices and multiple Operating systems getting released. Ex: a software application must consistently behave across platforms and should be compatible with latest released versions. And other external factors like availability and stability of network at various places and different time zones. There is a need for an end-to-end mobile testing solution that has all the requirements, setups and resources for the complete testing of mobile applications under real-time end-user scenarios. To have a solution, functional & Non – functional challenging areas are to be evaluated.

Keywords: Mobile Devices, Platforms, Time Zones, Mobile Applications, Functional and Non functional, Challenges.

INTRODUCTION

Importance of Mobile Application Testing
In current situation of competitive market conditions, and availability of multiple variants of Mobile devices (Phones and Tablets) and handheld devices with various Operating systems (iOS , Android, Windows Mobile, Symbian, etc.,) and migration of most of Web applications made available in Mobile versions, There is an increased demand for Mobile Application Development and Testing.

Solutions to test Mobile applications are available with their own challenges, uncovering the part of testing Applications Performance & Security requirement. Which is mostly disclosed when delivered to real end-user experience.

List of preconditions must be checked before delivering a new application or a software updates or upgrades are:
Check if the applications meets the current demands of the end users or customers. My ensuring that the applications functional, Non-functional and security requirements are met. We not only test the functionality of the app in in-house setup. We should also conduct mobile performance and functional testing under realistic end-user environment like field test, Functional Mass test, multi-browser test, latest devices with different resolutions, load and network conditions.

What does it take to test mobile applications? Mobile application testing is as similar as testing any other applications like:
- Test setups should be setup that reflect real-time conditions.
- Testing must be done under precisely stressful and iterative scenarios considering the load and extreme scenarios.
- Testing should involve "what if" analysis and consider testing boundary scenarios.
- Testing must account for performance impacts on both users and infrastructure.

Problem Area 1: Does the test solution support testing on simulators, current devices and emulators available in today's market?
Mobile application testing must be performed on devices that simulate test conditions. The extreme conditions of positive and negative scenarios of each of these approaches should be fully considered when formulating our mobile testing strategy. Mobile emulators come in the form of client software packages that are free to download and run on our local system. They provide a simple, low or often no-cost means of testing apps against different mobile operating systems. This makes them a popular choice for testing code early in the development cycle. But there are downsides to emulators. They don't emulate all the features and functions of real devices, and they don't run over a mobile network. Even if our app performs well, we can't be sure that it will work the same way on real devices. Testing on real devices is the only

way to make sure to understand the actual user experience, considering variables such as CPU, memory, and the specific characteristics of the varied device matrix.

Problem Area – 2: is it possible to access the current Servers/ devices virtually (cloud solutions) than having it setup in-house Lab?

Mobile testing solution in today's market allows remote access to a wide range of devices that are available in market. Devices that are accessible remotely gives flexibility to have our test devices in one place and our developers and testers in distributed environments having access to it. Generally, Test devices are based on internal lab that we operate or hosted in a cloud by a service provider. With a testing solution that supports remote access, we can use only remote—or both local and remote will give us greater flexibility and will help us to scale our testing efforts.

Problem Area – 3: Will the solution also support automation?

With manual approaches, Testing team would perform and implement test process only by manual intervention. With automated testing, the team performs the same with the help of automated test script will less manual intervention. Whenever there are frequent changes in code, it makes more sense to test it manually as it cannot be tested by automated test script as the code is still undergoing changes and development is in progress. It is always recommended to follow manual methods to begin a mobile testing program as the investment is huge to invest in procuring automation tools. As and when the code becomes stable and number of lines increases consistently and when there is can be proven return on investment in terms of money, time and fast to market, organizations would want to move to automation.

Automation is efficient compared to manual process, when it can greatly reduce the time and costs of testing along with greater scalability and broader test coverage by providing a better user experience. With automation, we can cover more device combinations and latest versions of the leading mobile operating systems with much smaller requirements for staff time.

Problem Area – 4: Internal or external solution should consider setting up environments having real-world network scenarios.

Mobile apps are subject to many network-driven variables when compared to web-based apps. With mobile apps, network conditions such as response time, slow/lost bandwidth, limited bandwidth, and data loss between

multiple network layers must be considered when testing an app and validating the end-user experience. These network-related variables must be considered in the QA and development process. Hence a suitable virtual mobile testing solution should be looked at than trying to set up the complete in-house environment.

Problem Area – 5: will the solution support testing unexpected interruptions?

Performance and functionality of an app can be interrupted in many ways like receiving push messages, video and phone call requests, alarms, reminders, low memory and battery alerts. Our mobile testing solution should give the ability to simulate common user scenarios to identify the impact and fix on the end-user experience.

Problem Area – 6: Does the solution support recognition of objects to help automation?

In mobile app testing, as part of record and play, it is mandatory to recognize the object in the screen. Testing tools use different methods like Ids, class identifiers, xPaths, names etc to recognize these objects. It's important to understand the differences in these methods when choosing a test solution so that it is easier to maintain.

Problem Area – 7: Will the solution support functional, non-functional, stress, Load and security testing?

There are three layers in mobile app testing: functional, performance and security:

Mobile functional testing validates the functionality of the app to check if the right product is developed.

Non-functional testing evaluates how well the app performs under stressful conditions—e.g., does the app crash / hang when considerable number of users trying to watch same video.

Mobile security testing identifies vulnerabilities in the software such as credential management issues, cross-site scripting, or memory consumption, data storage leaks.

Problem Area – 8: Can we implement the concept of Build-once and use across?

To increase the return on our mobile app testing investments, we want a solution that makes it easy to reuse test scripts. The ability to reuse test scripts across devices with the same OS or different OS will help user to save time, save money, and accelerate time to market for our apps, while increasing our test coverage. The goal should be to reuse as many tests or portions of tests as possible, to avoid reworks.

Problem Area – 9: Does the identified solution capable of testing built-in APIs/ native components, reusable scripts and customized functionalities?

Guidance from automation test experts who had evaluated and used various automated test tools by analyzing various parameters like what, when and how to test?

Native apps are written in the specific language of the mobile operating system (OS). Web apps are written in common web languages, such as HTML5 or Java. Hybrid apps are written in a combination of languages and leverage a software shell that allows users to tap into the native capabilities of the device, such as the camera or GPS, which pure web apps cannot do. Our mobile testing solution should be designed to handle all three types of apps. Moreover, it should understand the nuances and richer functionality of native apps, so we can test accordingly. For example, compared to web apps, native apps have greater access to all the functionality on the mobile device, and our solution for iPhone and Android testing needs to take this into account.

Problem Area – 10: is it possible to integrate testing tools with development and Requirement management tools?

With new Agile environment in place, it is expected that the code that is developed and tested incrementally, hence it is more relevant to identify and select such tools to enable higher flexibility of providing continuous software delivery and would enable more productivity and help accelerated high quality software.

In addition to integration with development tools, our mobile testing solution should have the capability to be integrated with our application lifecycle management (ALM) or agile project management tools. This created greater visibility and traceability to all stakeholders in the application delivery process to get the day to day updates and status on the overall project to help stakeholders to monitor, prioritize and take decisions.

Problem Area – 11: Is there any test support or service from test specialist from vendors?

We would be mostly in need of support and guidance on the tool to explore the tools based on our needs. In such cases we would need test specialist to guide us by understanding the project need which would help us increase return on investment, to enable quicker to market and to stay ahead in the markets competition.

Conclusion

Testing phase of mobile applications is very critical and challenging stage of any mobile application development. Majority of issues (Application / Functional / Stress /

Load / Network density / Operating system related can be found and rectified and ensures quality through the successful mobile application testing, so it is the best practice that we need to identify the problem areas first and consider those as risks and prepare the testing approach accordingly and follow, we can able to develop More successful and quality Mobile applications.

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