

Chapter 2

Mobile Application Testing

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ABSTRACT

Statistics hold that 80% of the mobile applications are deleted after just one-time use. A significant reason for this can be attributed to the quality of the mobile application, thus impressing on the need for testing a mobile application before it is made available on the app stores. At the same time, the mobile application lifecycle time is shrinking. So while operating systems used to get release about once in a couple of years, mobile operating systems get updated within months. And talking of apps, new apps are expected to be built and released in a matter of weeks. This impresses the need for automated mechanisms to do mobile testing. The space of mobile application testing is challenging owing to the variety of phone devices, the operating systems and the conditions under which an app can be used by the user in the wild. This chapter is focused on tools and techniques that are used for automated testing of mobile applications.

INTRODUCTION

Testing mobile applications is an emerging research area that faces a variety of challenges due to increasing number of applications getting developed and a plethora of new devices being released into the market. These new devices have varied form factors, screen size, resolution, OS, hardware specification etc. which increases the difficulty to effectively test an application. Also, in comparison to conventional Desktop and Web applications, mobile applications have shorter release cycles (lesser time-to-market) and the update frequency is high, making it necessary for the tester to perform additional testing quite often. Due to these factors, testing a mobile application becomes a very expensive, laborious and time consuming process. This chapter primarily focusses on explaining the inherent challenges and solutions associated with different types of mobile testing.

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The goal of any mobile testing solution is two folds. The first aim is to ensure that all possible challenges with respect to the application are detected. Detection of such challenges, which could be functional issues in the application, or usability issues that make the application difficult to use, or performance issues that make the application frustrating to use due to resource constraints. The second, optional but preferred, aim is to determine the cause of such a challenge.

As has been discussed in earlier chapters, there are at least three different ways of building a mobile application: native, hybrid, and web. Each of these mechanisms differ in the way where and how most of the processing of the application happens. To complicate matters further, a mobile application can access backend data and services over the network. In such a complex scenario, it is important to determine the challenges in a mobile application, not only from within the mobile device, but across entities that are eventually enabling the application to execute. Such issues make mobile application testing an interesting and a challenging software engineering problem to look at.

ORGANIZATION OF THIS CHAPTER

Testing a mobile application has some obvious key goals. The main goal being that the application should work well. However, from a software engineering perspective, we need to ensure that the application does the task for which it is designed, and does it easily enough so that users can use it easily and does it with optimal compute resources. These main characteristics of a desirable good mobile application then raise three key forms of mobile testing. Functional testing is performed to ensure functionality, i.e. to test whether the application is performing the functions that it was designed for. Performance testing is conducted to determine how optimal the application is, in terms of its compute resource usage, battery usage and latency related issues. And finally, Usability and Accessibility testing aims to capture how easy is for users to be able to work with the applications to execute the functions for which the application is designed. All of these three different forms of testing have an implication to each other and so are not strictly orthogonal. However, a division of purpose enables to determine the source of the problem in a mobile application, thus making the possible solutions and the resources required to fix it. As an example, if there is an issue detected in usability of the application, then perhaps designers are best at fixing them. On the other hand, if there is an issue with respect to the performance of the application, such as the response is too slow (which itself can lead to usability issues), then a software engineer having knowledge of the mobile operating system should get involved. For such reasons, in this chapter, mobile testing will be studied under these three umbrella topics: functional, performance, and usability & accessibility. At the end of this chapter, we discuss detailed literature survey on these three umbrella topics with various discussion on latest trends followed in mobile testing. But before studying each one of these in detail, let us discuss the basics of mobile testing in the next section.

KEY COMPONENTS OF MOBILE TESTING

Mobile Applications are tested in 3 main ways: unit, manual and automated testing. This chapter is mostly focused on automated testing and its associated challenges and standards, but we will also discuss below about the unit and manual testing process at high level, from a completeness perspective.

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