



iOS Penetration Testing

A Definitive Guide to iOS Security

—

First Edition

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Kunal Relan

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*This book is dedicated to my mom, my spiritual guru for inspiring
me to live, my mentor who always supported me
in this journey, and to all the weirdoes like me; I love you all.*

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About the Author



Kunal Relan is an iOS security researcher and a full-stack developer who has been working as security lead for Mozilla, Delhi.

He has published several research papers on information security in the esteemed *Journal of ACM*. Having obtained the acclaimed CCNA Security certification, he is also an Owasp ZAP evangelist. With his thriving experience as a security researcher and penetration tester, Kunal is known for actively reporting security bugs in a mobile and web applications. During the past few years, he has been working as a mobile application penetration tester and a security researcher in New Delhi. Currently working as a security consultant, he is the guy behind owlpro, a WordPress security scanning platform.

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Nishant Das Patnaik is an experienced application security and SecDevOps engineer. He is based out of India and is currently working for eBay in Bangalore. In the past, he has worked as an AppSec and SecDevOps engineer at InMobi and Yahoo. He loves to share his work with the community as open source projects and hence has been a presenter at Black Hat Europe 2016, Black Hat USA 2016, Black Hat USA 2013, and Nullcon 2012. He loves to code on Python and JavaScript. You can reach out to him on Twitter at [@dpnishant](https://twitter.com/dpnishant) and check out some of his open source projects at github.com/dpnishant. When he is not working, you can find him playing a piano or experimenting at the kitchen.

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Introduction

iOS is one of the most famous mobile operating systems in the world after Android, having about 28% of total mobile operating system market. Since its release in June 2007, it has evolved, and the current stable version is iOS 9.3.3. Apple has a stronghold of the mobile market, making it the second most used mobile OS in the world. iOS is a closed source operating system, unlike its rival Android, which is open source. That makes Android the de facto mobile OS for all other hardware manufacturers including Samsung, LG, HTC, etc. Since its release in 2007, iOS has been prone to jailbreaking; however, Apple has worked hard to make the security of iOS tighter with every release. They still have not managed to avoid jailbreaking totally and the current stable version iOS 9.3.3 already has a public jailbreak available by the Pangu team, which also claims to have jailbroken the latest iOS 10 beta. This leaves a big question mark on Apple about jailbreaking and other security issues being addressed.

iOS has always been a target of attackers, with many security breaches and casualties in the past, even though Apple has been very strict with its security policies and the App Store environment, which has a lot of restrictions on app development and deployment. Apple has also been very restrictive on giving up user data APIs to developers, and has denied a lot of Private APIs for use in apps, unlike Android, which gives its users data API like SMS, call history, etc. On the top of that, it has a sandboxed application environment in the OS that isolates the application from the operating system. Even with iOS's tight architecture, app developers still manage to make their applications vulnerable to attackers, due to penetration testing and reverse engineering in iOS. This is very different from the Web or Android setup, with Android running applications built in Java, which makes it easier to reverse engineer. This book will be your guide to working with iOS penetration testing and reverse engineering, and I recommend you go through each chapter thoroughly, follow the tutorials, and try replicating them on your end.

CHAPTER 1



Introduction to iOS

iOS has been around since 2007, when we first saw the iPhone, a beautiful device with iOS in it. Developed by the Apple Macintosh team, it was originally called iPhone OS, was renamed to iOS in 2010, and now runs Apple's iPhone, iPad, and iPod Touch. It is the second most popular mobile phone in the world after Android. iOS has been around for nine years and we have seen a lot of changes since its launch. It has always been in the spotlight for its security bugs, with the first bug hitting the web in 2007.

In this chapter, we talk about how iOS works, how it manages to keep away the malware from the App Store, and how the architecture of iOS is laid out. This chapter is an introduction to iOS and covers all the basics needed to understand the coming chapters. If you already understand the architecture of iOS and its file system, you can skip this chapter and move on to the second one, but it is always a good idea to brush up on your knowledge.

■ **Note** We will be following Apple's latest 9.x and 8.x iOS versions; however, most of the features and issues are backward compatible and may work in upcoming versions as well.

iOS Introduction

iOS has been a popular operating system since its inception and its App Store has more than 1.5 million apps, of which 100 billion copies have been downloaded. iOS has always been praised for its user interface and is based on the concept of direct manipulation using multi-touch gestures. iOS shares Core Foundation and Foundation Kit frameworks with the popular OS X (the operating system in the MacBook); however, it has its own upgraded version of UIKit called Cocoa Touch. iOS also shares the Darwin foundation with OS X, which is an open source UNIX operating system released by Apple in 2000. However, iOS still doesn't provide UNIX-like shell access to users. At the time of writing this book, iOS 9.3.1 is the latest release and 9.x and 8.x are the most commonly installed releases in current devices.

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