The OK Is Not Enough: A Large Scale Study of Consent Dialogs in Smartphone Applications

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This artifact appendix is included in the Artifact Appendices to the Proceedings of the 32nd USENIX Security Symposium and appends to the paper of the same name that appears in the Proceedings of the 32nd USENIX Security Symposium.

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USENIX'23 Artifact Appendix: "The OK Is Not Enough: A Large Scale Study of Consent Dialogs in Smartphone Applications"

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A Artifact Appendix

Our artifact submission contains our used tool chain to intercept network traffic of smartphones and analyze any present privacy dialog. This entails a set of three Scala programs and their dependencies. We are applying for the artifacts available badge.

A.1 Description & Requirements

While we only apply for the artifacts available badge we do list anticipated concerns when running our software before describing the access and depdenencies.

A.1.1 Security, privacy, and ethical concerns

Simply checking out the availability of the artificats does not entail any concerns. However, using our artificats has minor privacy and security concerns.

Ethical Concerns: There are no ethical concerns as our programs runs on self owned devices and evaluates software in a non-intrusive fashion.

Privacy Concerns: There are minor privacy concerns as using the software to evaluate the privacy violations of apps implies running the apps and observing transmitted traffic. We have seen traffic containing location data as well as limited network information (local IP addresses). However, our analysis of the observed traffic is not complete and unevaluated parts of the traffic may contain more sensitive data. We strongly advice using test accounts as well as test devices for both Android and iOS if the reviewer wants to test our software to limit the impact of possible data leaks.

Security Concerns: App measurement studies entail the execution of large amount of apps on real device within the network. Depending on the sourcing of the apps there is always the possibility of maleware being installed and executed. Using the official App Stores as a source mitigates that risk but neither Google nor Apple have perfect security checks. We strongly advise using a separate network as well as using research devices that are not intended for any personal use.

A.1.2 How to access

Our artifact has three major components with sub dependencies that need to be installed. Each linked repository contains a `README.md` that goes into details concerning installation and usage. Furthermore, we grouped our artifacts using a GitHub org that also references the paper and has a intruductory `README.md` at https://github.com/the-ok-is-not-enough[1].

app-downloader: A tool to download the current rankings as well as APKs/IPAs from the Goolge and Android App Store available at https://github.com/the-ok-is-not-enough/app-downloader[2].

However, two tools are required for the downloader to work properly which we forked and made available as a stable artifact: https://github.com/the-ok-is-not-enough/googleplay[3] and https://github.com/the-ok-is-not-enough/ipatool-py[4].

scala-appanalyzer: A tool to run apps on either an Android Smartphone or iPhone collect traffic as well avaiable at: https://github.com/the-ok-is-not-enough/scala-appanalyzer[5].

scala-plotalyzer: A tool to analyze, aggregate, and summarize data collected by the scala-appanalyzer available at: https://github.com/the-ok-is-not-enough/scala-plotalyzer[6].

[1] commit:32b904b4e21c45b345bc1b9cbfd84f6661177b6b
url:https://github.com/the-ok-is-not-enough/.github/tree/32b904b4e21c45b345bc1b9cbfd84f6661177b6b/profile
[2] commit:0d41a37e4e1c5c2f4e6be19837f758f8eae98fc6
[3] commit:4c178c10bc3cc5ab2e6895016e7161296777dca0
[4] commit:a8b2d37bba40ed427420f6a2a8fa9a89c4844256
[5] commit:b618948c0d24b917b3a46a88f5c1cf6ff84571cd
[6] commit:d89a76985b20d140f949b0a86438c38de09388bd

A.1.3 Hardware dependencies

Depending on the targeted smartphone eco system different hardware is required. While it might be possible to replace some requirements (e.g., the measurement machine, or Android Smartphone to the Android Emulator) we cannot guarantee functionality or anticipate the impact on the results. In case no OpenWRT router is available it is also possible to directly use the test machine as a proxy by changing the corresponding Smartphone OS configuration, however, it is not guaranteed that apps will always adhere to this configuration and some traffic might be missed.

Always:

- WLAN Router able to run OpenWRT
- Network/Internet connection

iOS

- MacMini connected to the Internet via Cable and also to the WLAN
- rooted iPhone 8s
- Lightning Cable

Android

- rooted Samsung Galaxy A13
- Micro USB/USB Cable
- any recent computer able to run Arch Linux connected to the Internet via Cable and also to the WLAN

A.1.4 Software dependencies

Depending on the targeted smartphone eco system different software is required. While it might be possible to replace some requirements (e.g., the OS of the measurement machine) we cannot guarantee functionality or anticipate the impact on the results.

We only list the general requirements here as each of our tools contains a `README.md` with more detailed instructions that would exceed the available space limit.

Always:

- OpenWRT (on the router)
- Scala 2.13
- Go
- Python 3
- Objection
- Frida
- Postgres
- MitMproxy
- Appium

iOS

- MacOS (on the measurement machine)
- xCode
- rooted iOS 14.X (on the iPhone)
- cydia/checkRa1n (to root the iPhone)

Android

- rooted Android (on the Galaxy A13)
- ArchLinux (on the measurement machine)
- Android Studio

A.1.5 Benchmarks

None.

A.2 Set-up

We are only applying for the artifacts available badge. However, each repository contains a `README.md` with instructions on installation and usage.

A.3 Notes on Reusability

While the provided URLs reference the Artifacts as used in our published paper we are continuing the development of our measurement framework and made some major changes significantly improving adaptability and usability. We are excited by the posibility that our tools might be of use for other researchers and strongly advise checking out development branches available at https://github.com/simkoc/scala-appanalyzer and https://github.com/simkoc/scala-plotalyzer as those represent the current state of the art as used by us. For example the new versions provide a plugin system making it easier to extend the functionality without having to do major changes on the main program. We also added emulator support for Android.

A.4 Version

Based on the LaTeX template for Artifact Evaluation V20220926. Submission, reviewing and badging methodology followed for the evaluation of this artifact can be found at https://secartifacts.github.io/usenixsec2023/.