

# Android Root Detection Evasion

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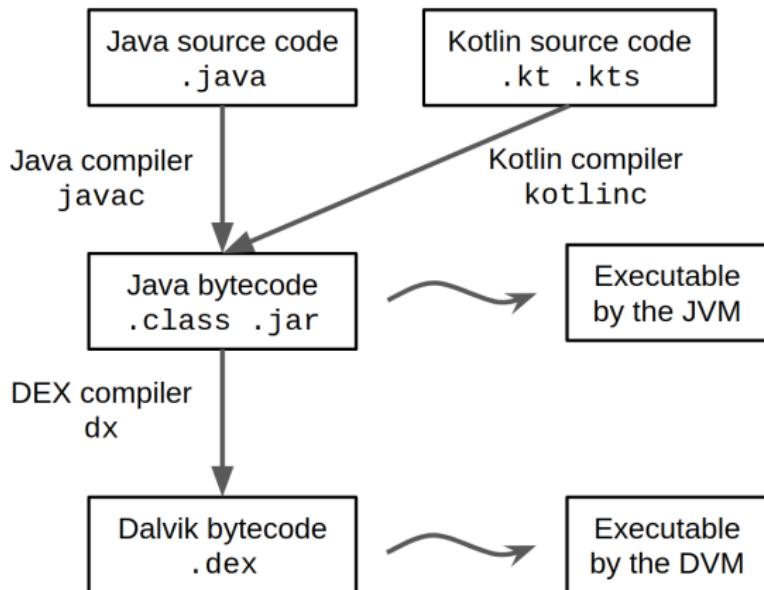
# fundamentals: Android



<https://source.android.com/devices/architecture>

by default a user has no root access, despite being the owner of the device

# fundamentals: Java to bytecode and back



MOBISEC 2020 - 10 - Native Code

at the end of the build process everything is packaged in a .apk file

# root detection: how

- check for root management apps (com.topjohnwu.magisk)

```
import android.content.pm.PackageManager;
import android.content.Context;
private final Context mContext;
PackageManager pm = mContext.getPackageManager();
pm.getPackageInfo(packageName, 0);
```

- check root cloaking apps

```
(com.devadvance.rootcloak, de.robv.android.xposed.installer)
```

- check for dangerous applications (com.dimonvideo.luckypatcher)

- check for binaries (busybox, su)

```
File f = new File(path, filename);
boolean fileExists = f.exists();
```

- check if some paths are writable (/system, /sbin, /etc)

```
InputStream inputStream = Runtime.getRuntime().exec("mount")
```

# patch-and-reinstall

- pull the APK
- apktool d app.apk
- patch
- apktool b app
- sign the APK with apksigner
- reinstall the patched APK
- this approach does not require the android device to be rooted

# patch-and-reinstall: an example

The patching process is usually a matter of finding the methods performing root detection and patching them, here is an example from a popular financial services company's application:

```
Author: rcastellotti <me@rcastellotti.dev> 2022-06-29 01:17:32
Committer: rcastellotti <me@rcastellotti.dev> 2022-06-29 01:17:32
Parent: 4e6c812897a3d9e1187e9fafd77619b8f2b0540a (decompiled)
Child: 20844736e60bf98792250e4d4ed48af41b143 (added [REDACTED] patch)
Branches: main, remotes/origin/main
Follows:
Precedes:

i cant really believe this is the patch

[REDACTED]/smali_classes2/com/[REDACTED]/util/WuRootUtil.smali
index 6460600e0..866aaef619 100644
@@ -329,7 +329,7 @@
 
 :cond_1
 :goto_0
- const/4 v0, 0x1
+ const/4 v0, 0x0

 :goto_1
 return v0
```

patching .method public static isDeviceRooted()Z

# frida: a dynamic toolkit

- provides ability to inject scripts into black box processes.
- portable (Windows, macOS, GNU/Linux, iOS, Android)
- **injected mode:** frida-server: frida-core over TCP
- frida-core: a layer that packages up GumJS into a shared library that it injects into existing software, and provides a two-way communication channel for talking to your scripts.
- **on device:** ./frida-server-15.1.27-android-arm64
- **on computer:** frida -U -l script.js -f com.package.name
- this approach could be better since it allows to patch applications without losing original package signature

# frida: script.js

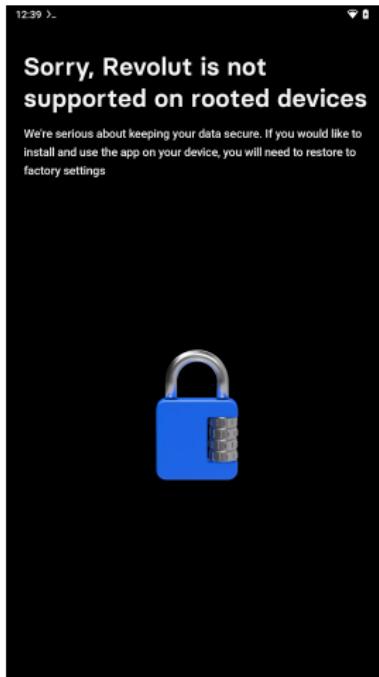
```
Java.perform(function () {
    var PackageManager = Java.use("android.app.ApplicationPackageManager");
    var NativeFile = Java.use("java.io.File");
    var Runtime = Java.use("java.lang.Runtime");

    PackageManager.getPackageInfo.overload(
        "java.lang.String",
        "int"
    ).implementation = function (pname, flags) {
        send("Bypass root check for package: " + pname);
        pname = "set.package.name.to.a.fake.one.so.we.can.bypass.it";
    }
    return this.getPackageInfo
        .overload("java.lang.String", "int")
        .call(this, pname, flags);
};

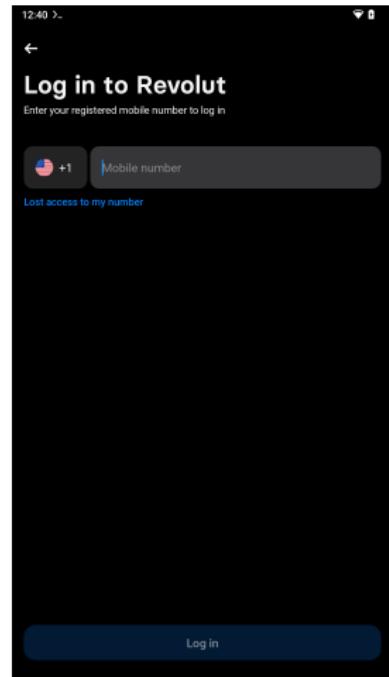
NativeFile.exists.implementation = function () {
    var name = NativeFile.getName.call(this);
    send("Bypass return value for binary: " + name);
    return false;
};
});
```

partially adapted from [@dzoncerzy/fridantiroot](#)

# com.revolut.revolut (fintech)



original APK

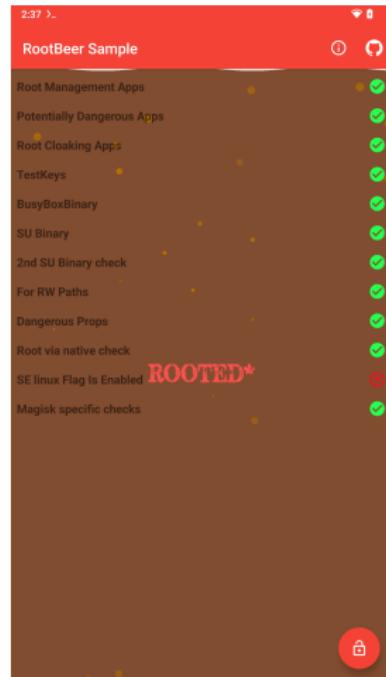


patched

# com.scottyab.rootbeer.sample

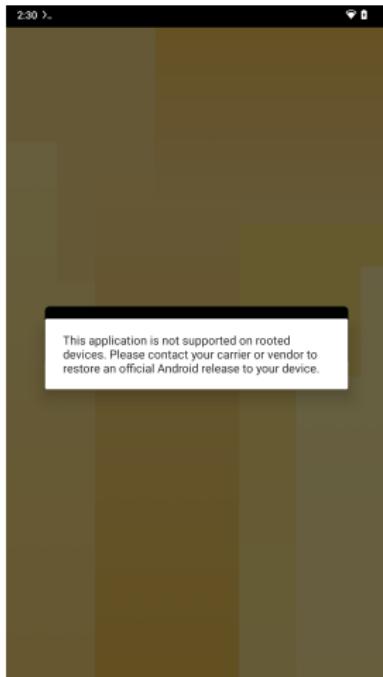


original APK

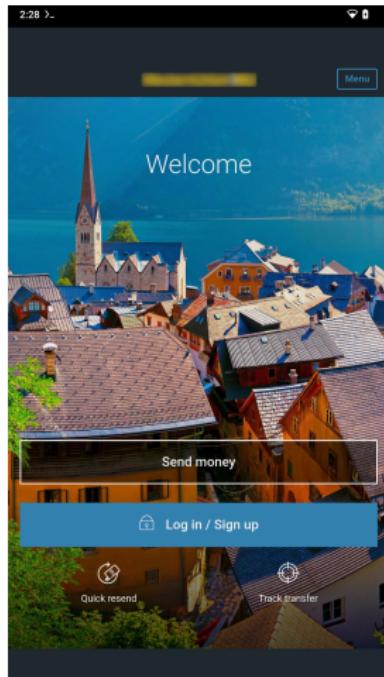


patched

# a popular financial services company's application



original APK



patched

*Thank You for your attention,  
Questions?*

# tools and sources

- [Android Studio](#)
- [iBotPeaches/Apktool](#): A tool for reverse engineering Android apk files
- [skylot/jadx](#): Dex to Java decompiler
- [scottyab/rootbeer](#): root checking Android library and sample app
- <https://en.wikipedia.org/wiki/Dalvik>
- [Dalvik Bytecode](#)
- [Anroid Runtime](#)
- <https://developer.android.com/guide/components/fundamentals>