

Android Root Detection Evasion

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Università di Genova

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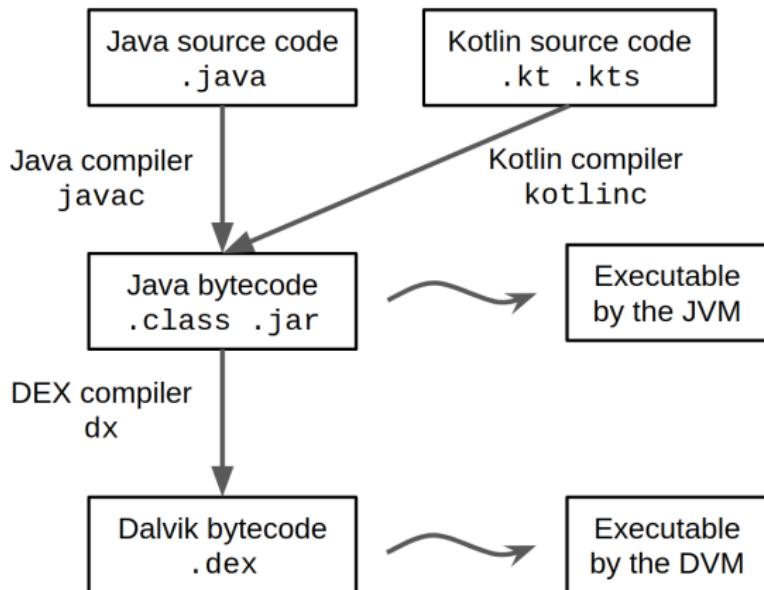
fundamentals: Android



<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)

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

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

patch-and-reinstall

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- ➋ apktool d app.apk

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- ➏ reinstall the patched APK
- ➐ 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

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- this approach could be better since it allows to patch applications without losing original package signature

frida: script.js

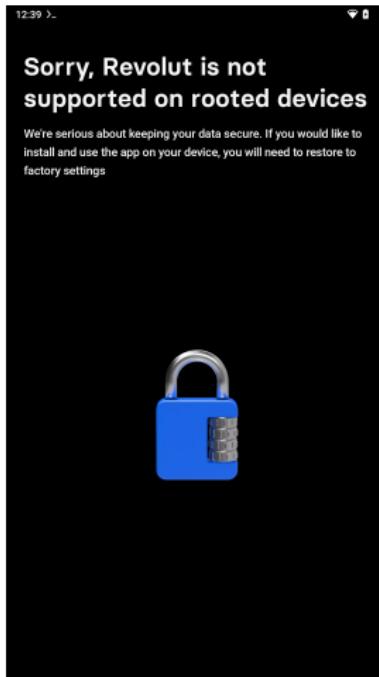
```
Java.perform(function () {
    var PackageManager = Java.use("android.app.ApplicationPackageManager");
    var NativeFile = Java.use("java.io.File");
    var Runtime = Java.use("java.lang.Runtime");

    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);
};

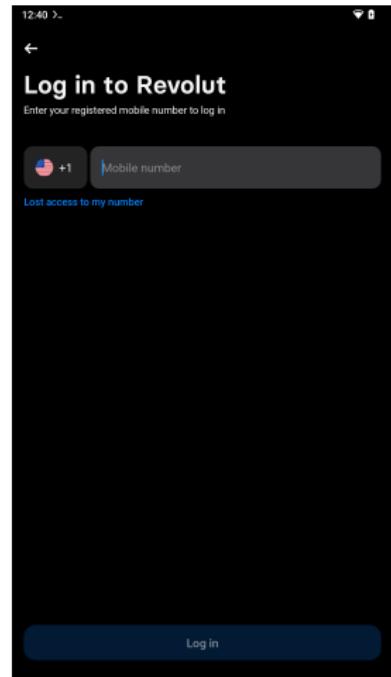
NativeFile.exists.implementation = function () {
    var name = NativeFile.getName.call(this);
    send("Bypass return value for binary: " + name);
    return false;
};
});
```

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

com.revolut.revolut (fintech)



original APK

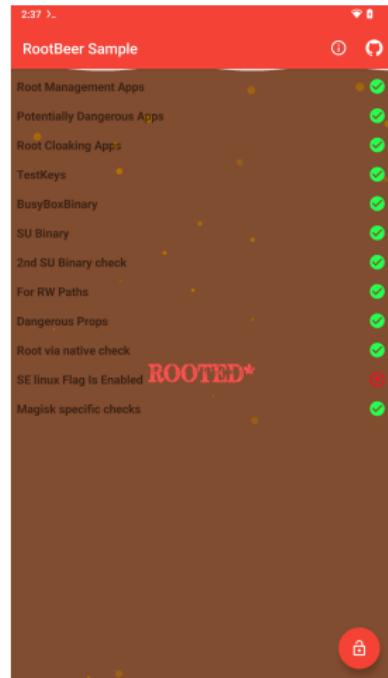


patched

com.scottyab.rootbeer.sample

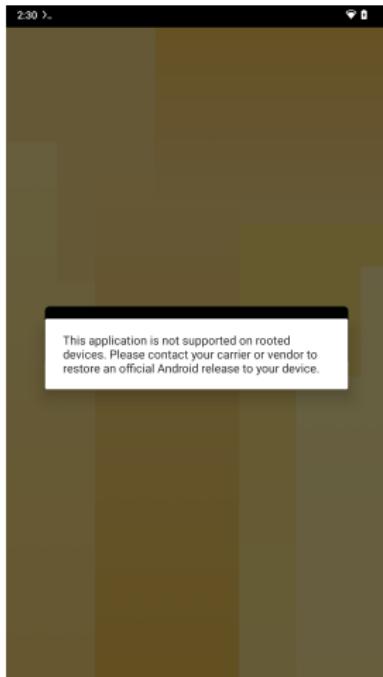


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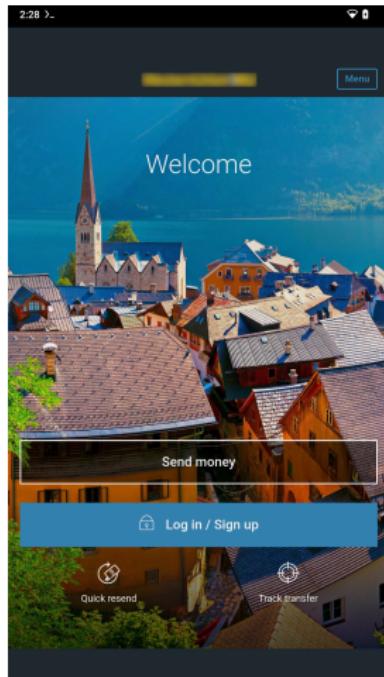


patched

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>