Android Root Detection Evasion

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fundamentals: Android

https://developer.android.com/guide/components/fundamentals

fundamentals: java to bytecode and back

mobisec native code

fundamentals: unlocking bootloader, recovery, root (con magisk)

lineage, magisk, twrp, tool vari approfondimento dm verity a cosa serve il root

root detection: why

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 appps (`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

- `adb pull /data/com/app/com.package.name app.apk`
- `apktool d app.apk -output app`
- patch
- `apktool b app -output rebuilt-app.apk`
- `zipalign -f -p 4 rebuilt-app.apk aligned-rebuilt-app.apk`
- `apksigner sign --ks  /key.jks aligned-rebuilt-app.apk`
- `adb install aligned-rebuilt-app.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:  28844736e60b1fb98792250e4d4ed48afd41b143 (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..866aaf619 100644
@@ -329,7 +329,7 @@

     :cond_1
     :goto_0
-    const/4 v0, 0x1
+    const/4 v0, 0x0

     :goto_1
     return v0
```

Figure: 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

tools used

- Android Studio
- iBotPeaches/Apktool: A tool for reverse engineering Android apk files
- skylot/jadx: Dex to Java decompiler
- scottyab/rootbeer: Simple to use root checking Android library and sample app