PSCG

Android Based Penetration Testing Framework

Android Builders Summit 2015

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about://Ron Munitz

- **Founder and CEO of the PSCG**
  - **The Premium Embedded/Android consulting and Training firm**
- **Founder and (former) CTO of Nubo Software**
  - **The first Remote Android Workspace**
- **Instructor at NewCircle**
- **Senior Lecturer at Afeka College of Engineering**
- **Working on an awesome stealth startup**
- **Building up on diverse engineering experience:**
  - **Distributed Fault Tolerant Avionic Systems**
  - **Highly distributed video routers**
  - **Real Time, Embedded, Server bringups**
  - Operating Systems, very esoteric libraries, 0's, 1's and lots of them.
    - Linux, Android ,VxWorks, Windows, iOS, devices, BSPs, DSPs,...

Agenda

- What is Penetration Testing?
- Pentesting Android devices
- Using Android as a Pentest module
- Future work

Introduction

Penetration Testing

- Penetration Testing (“Pentest-ing”) is the act of attempting to find weaknesses (“***exploits***”) in the system of test
- It is essentially ***attacking*** the system of choice, with permission for the purposes of
  - Evaluating system security
  - Finding weaknesses in the tested system
  - Analyzing the performance of a system in extreme conditions
  - More

Penetration Testing

- Usually done to prove the security of the product before unethical hackers take advantage of such ***exploits***.
- Or as a mean of preparing to *auditing*
- Or for research purposes.
  - Academic
  - Personal
    - Some time triggers “personal” undesired earning
  - Bug-Bounty

Typical life of an exploit

- An exploit is being found
  - hopefully by “the good guys”
    - Otherwise: Being used, until some good guys discovers it, and the following loop is closed
- It is being reported to the corresponding entities (depending on the products affected etc.)
- A *patch* (usually defines a “Security Update” is being published)

Typical life of an exploit

- The exploit is being published
  - e.g. the CVE List (https://cve.mitre.org/)
- It is extremely important not to publish an exploit before a fix is available.
- Sometimes, a fix cannot be available for all affected platform (e.g. old phones that do not receive OTA updates anymore).
  - Beware that.
  - That is extremely relevant to Android

Android zero-day exploits

- Many companies ship versions of Android
- Most of them never ship the latest or greatest version
  - When the phone/tablet/whatever comes out
  - Or at all
- At the mean time, some exploits that affect known versions of Android have been discovered and disclosed
- And users may be suspect to them forever…
- (Good/Bad?) Example: Rootkits

Rootkits

- Rootkits enable to gain superuser permissions on your Android Phone
- Which is really a Linux Phone
- Do the math...

Penetration Testing tools

- There are many pentest tools that maintain an open database of known exploits, and allow you to exploit a target
- Those tools can help you test your device for vulnerabilities
- Or exploit it or other devices…
- Metasploit is such a tool that allows you to
  - “Exploit yourself” - via adb/et.-al
  - Exploit others via malicious software...

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Pentesting Android Targets

Remote exploitation scenario

- Assume *S* , a metasploit server containing an enormous database of of Android exploits
- One can pack a module that connects to *S* within an APK
  - e.g. a Service within a game that may have been granted some permissions by the user
  - Especially if the phone is rooted...
- And opens a shell on the target side to connect to *S*
- Then Metasploit can work on the user's phone without them ever knowing about it!

Pentesting Android devices

- An Android ROM cooker (e.g. an OEM) may use those techniques for good causes
- To see whether the devices they are going to ship have no [disclosed] 0-day vulnerabilities
- Or to verify their injected 0-day malware is undisclosed by “current” public knowledge tools…

Pentesting Android devices

- Android penetration testing, just as any other pentest deals with diverse “victims” such as:
  - Apps [behavior under some conditions, fuzzing]
  - Resources [exhausting some resources, e.g network, memory]
  - Permissions [shellcodes/privilege escalation…]
  - User data [applies to each]
  - Forensics [also applies to each]
  - Information “over the wire” [e.g. redirect everything via a proxy / MITM etc.]
  - And much, much more...

Pentesting Android devices

- There are many tools that allow fuzzing and testing Android apps / network etc. Some of them area:
  - The monkey* suite
  - drozer
  - dSploit
  - And many many more.

Pentesting Android devices

- If you are able to build a ROM / have root access - you can port your own “legacy tools easily”
- If you just care for testing the software - an Android Emulator (or equivalent) would be just fine.

Using Android to Pentest other targets

Android as a Pentest Suite

- Since Android is essentially Linux, it can benefit from a lot of work that has been done on Linux hosts, to pentest other hosts/modules.
- For many of such cases, root access is essential (e.g. USB MTM attacks etc.)

Android as a Pentest Suite

- Kali Linux for Android is a very nice example for such system
- It is just another “Android/Linux distro”
- Using chroot on your Android device to start another Linux
- And connecting to it’s GUI via VNC
- Can be ran natively [if you want to port it]

Pentesting Mobile Ecosystems

- On these days, there are nearly no significant “self contained” applications.
- Not for the mobile app market
- Always two, there are:
  - A mobile app (*x deployments*)
  - A mobile backend

⇒ If the mobile backend (Servers etc.) is broken - so are the clients.

Pentesting Mobile Ecosystems

There are many ways to test, or try to break an app:

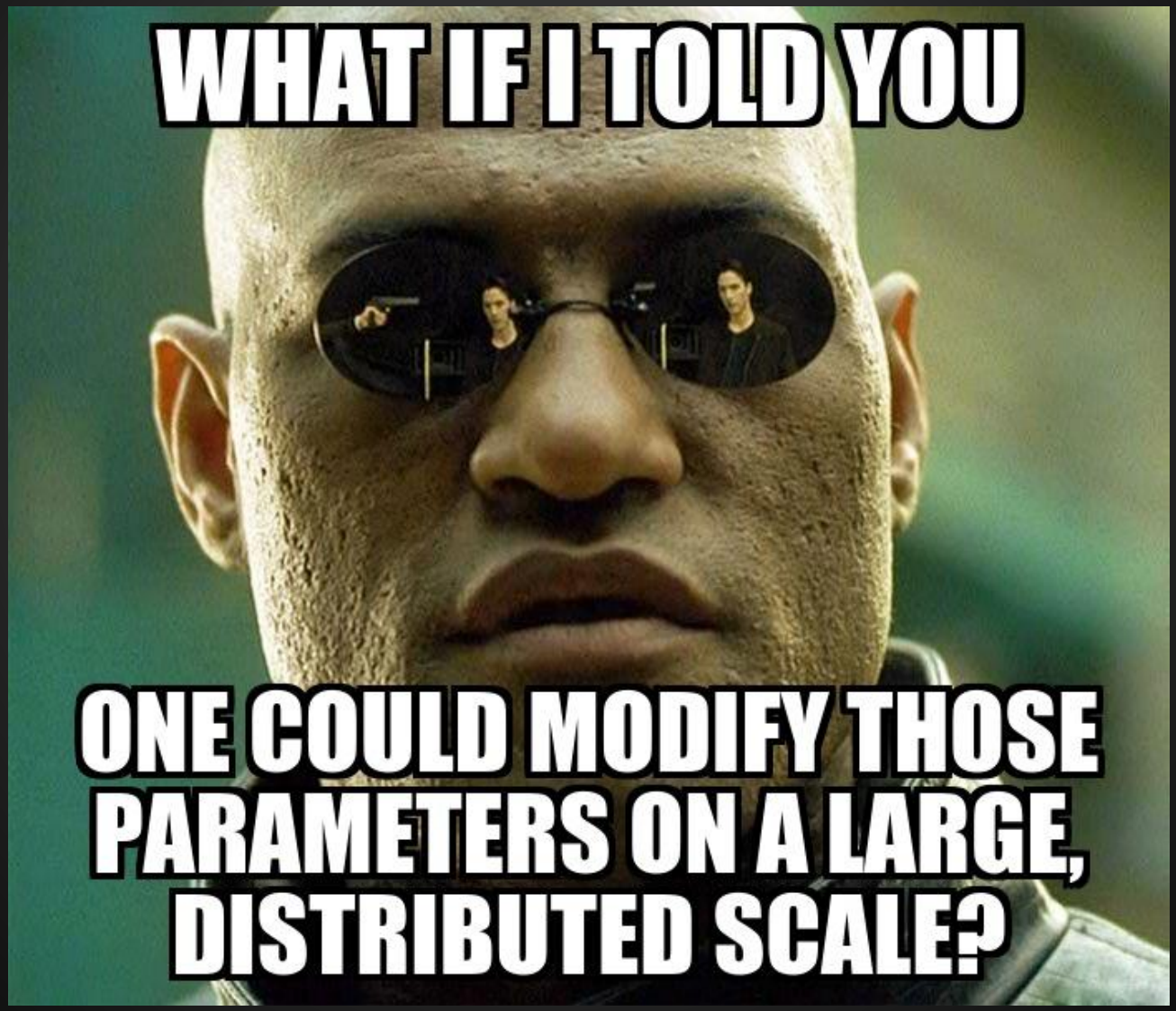
- From within the app itself [e.g. fuzzing the app, monkey* etc.]
- By denying a service from the app [e.g. overloading the servers]
- By cooperating with other apps to achieve some sort of DOS
- By breaking the rewarding activities / identification etc
  - In one line: Advertising, Monetization

Pentesting Mobile Ecosystems

(monetized) Mobile ecosystems are affected by many parameters:

- A user ID (AndroidID, AdvertisingID, etc.)
- User location
- IP, used networks
- User-Agent
- Particular device they are using
- Accounts
- And more...

Pentesting Mobile Ecosystems

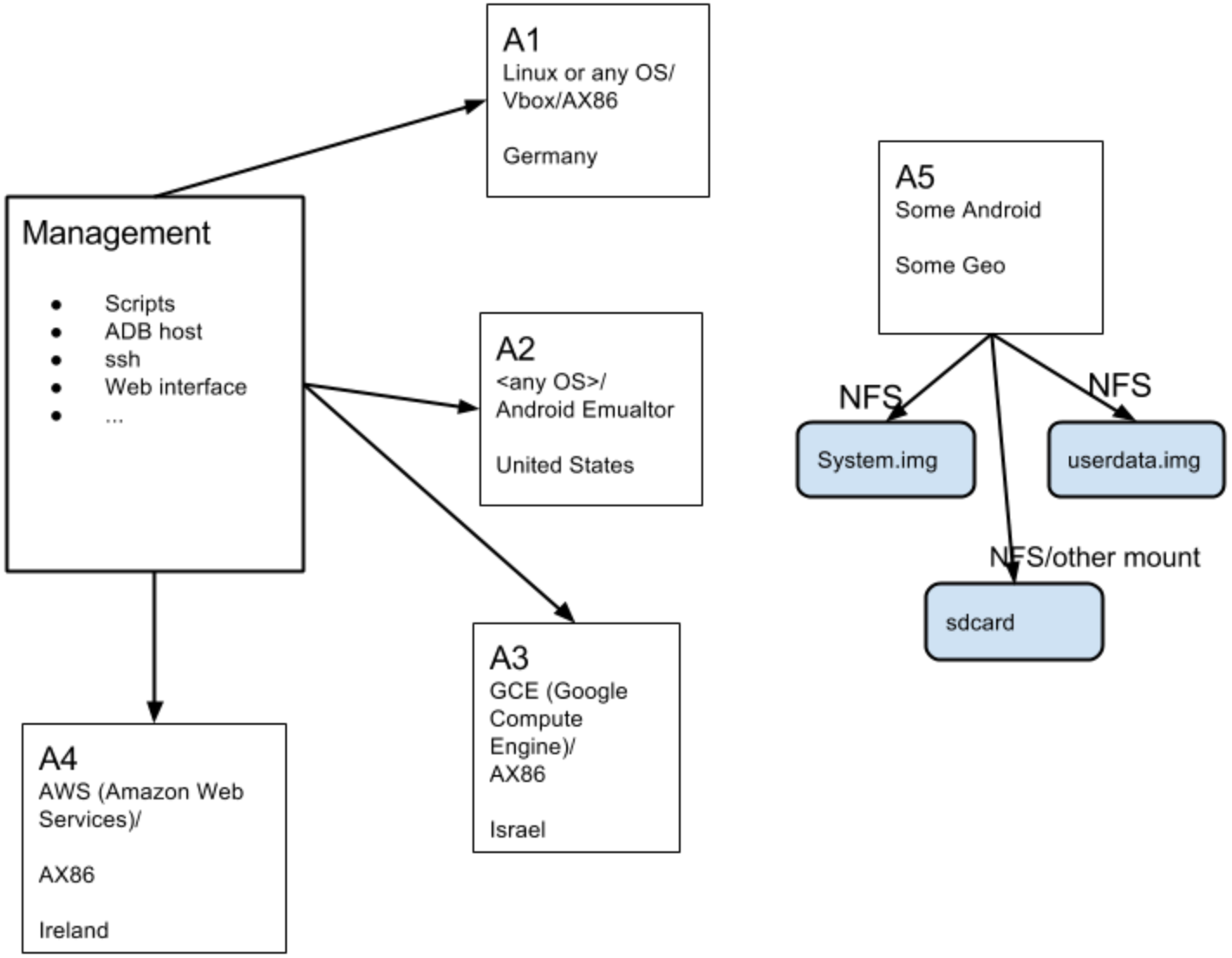


Pentesting Mobile Ecosystems

Well, one can:

- Leveraging on techniques done in remote application testing (e.g. Perfecto Mobile, Applause and similar solutions)
- But without the human or 1-1 interaction…
- Rather doing the same on a **much, much, much larger scale**
- Reducing operation costs by leveraging on:
  - Android Virtualization
  - Containers
  - Hypervisors

Pentesting, Scaling, Achieving



Why Morpheus?

- Because (Thank God) it's a Linux Conference, so there is no way you've never been asked "what is this matrix?!" after an endless make.
- In a next session I might use a Thor picture, for having them used "*whois*" in "Blackhat".
- For those who don't remember the morpheus slide - you chose the wrong pill.
  - It's not like I "sed-ed" the text with the image before uploading.

Thank You



Questions/Consulting/Training requests:
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