Reverse Engineering Android Malware

whoami

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Agenda

- Introduction to malware analysis
  - Why mobile RE?
- Reverse Engineering malicious Android applications
- Case study reversing SpyNote Android malware
  - Get our hands on some real malware!
- Android RE challenge

Malware Detection Flow

Threat hunter discovers potential malware

Malware sent to Reverse Engineers

RE decides malicious or clean

Writes detection to block malware

Platforms Targeted by Malware

Windows

Linux

Mac

Android

iOS

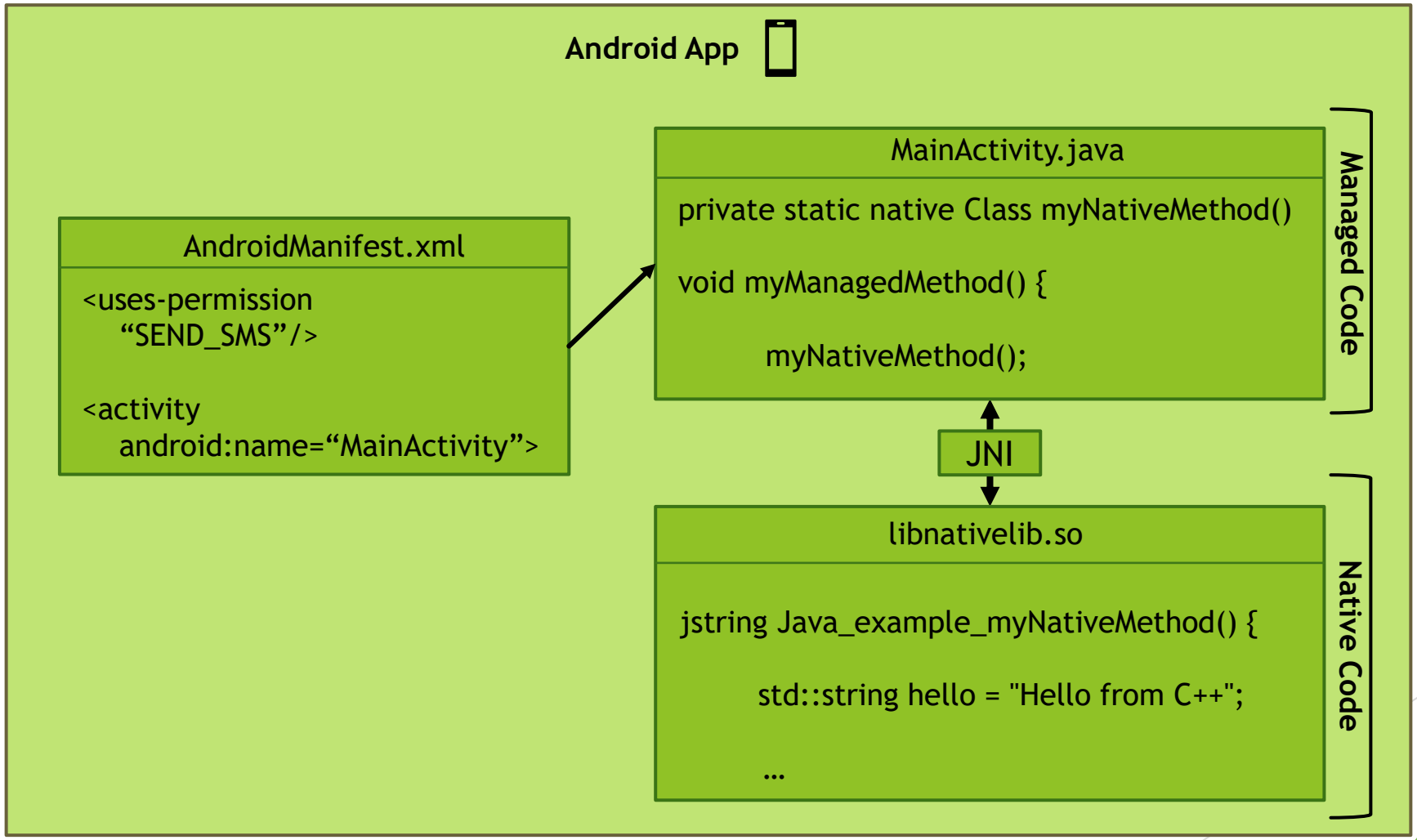
Common Malware Types

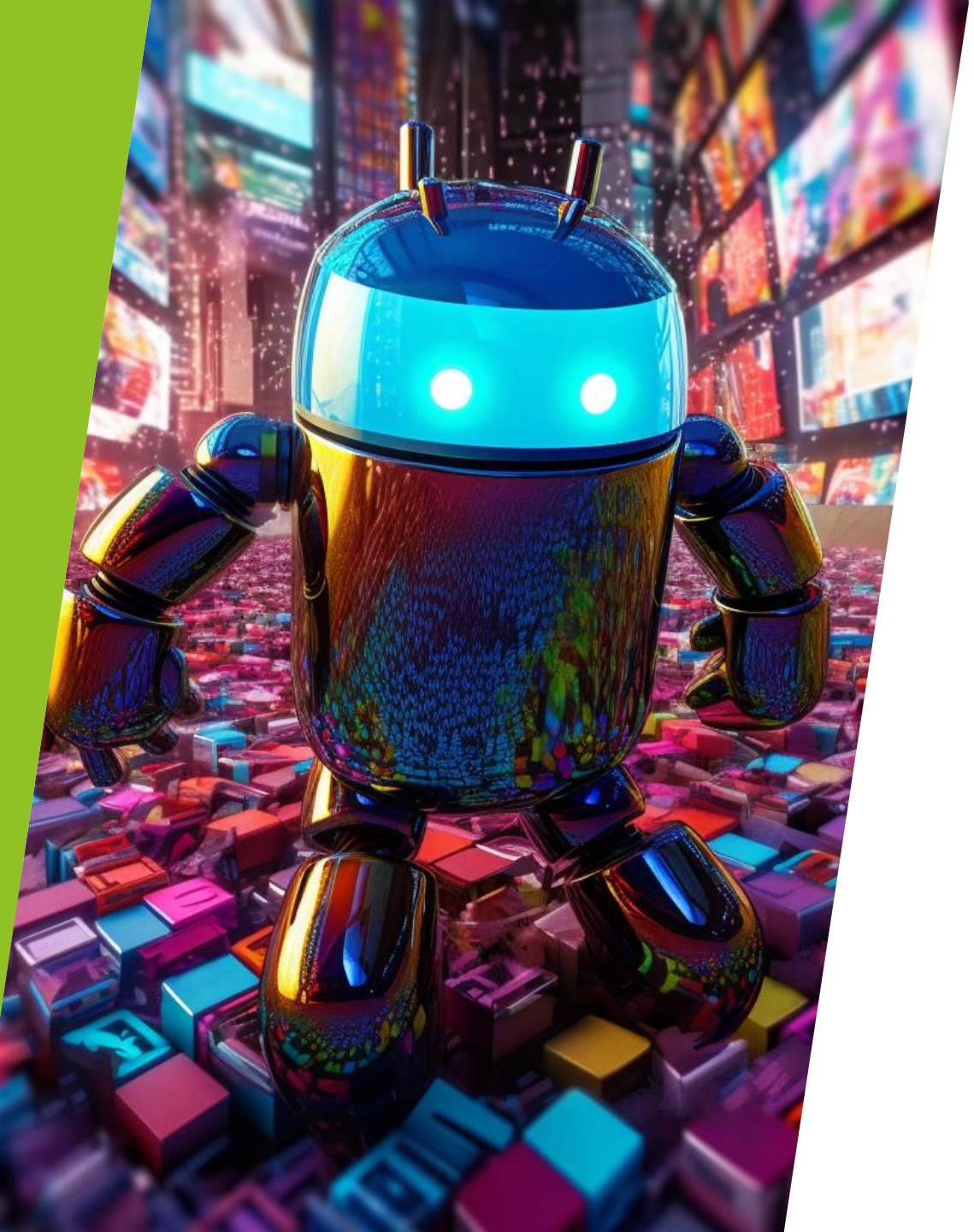
- Trojan
- Ransomware
- Keylogger
- Spyware

Mobile devices are a prime target for spyware.

Reversing Android Samples

Android App Structure



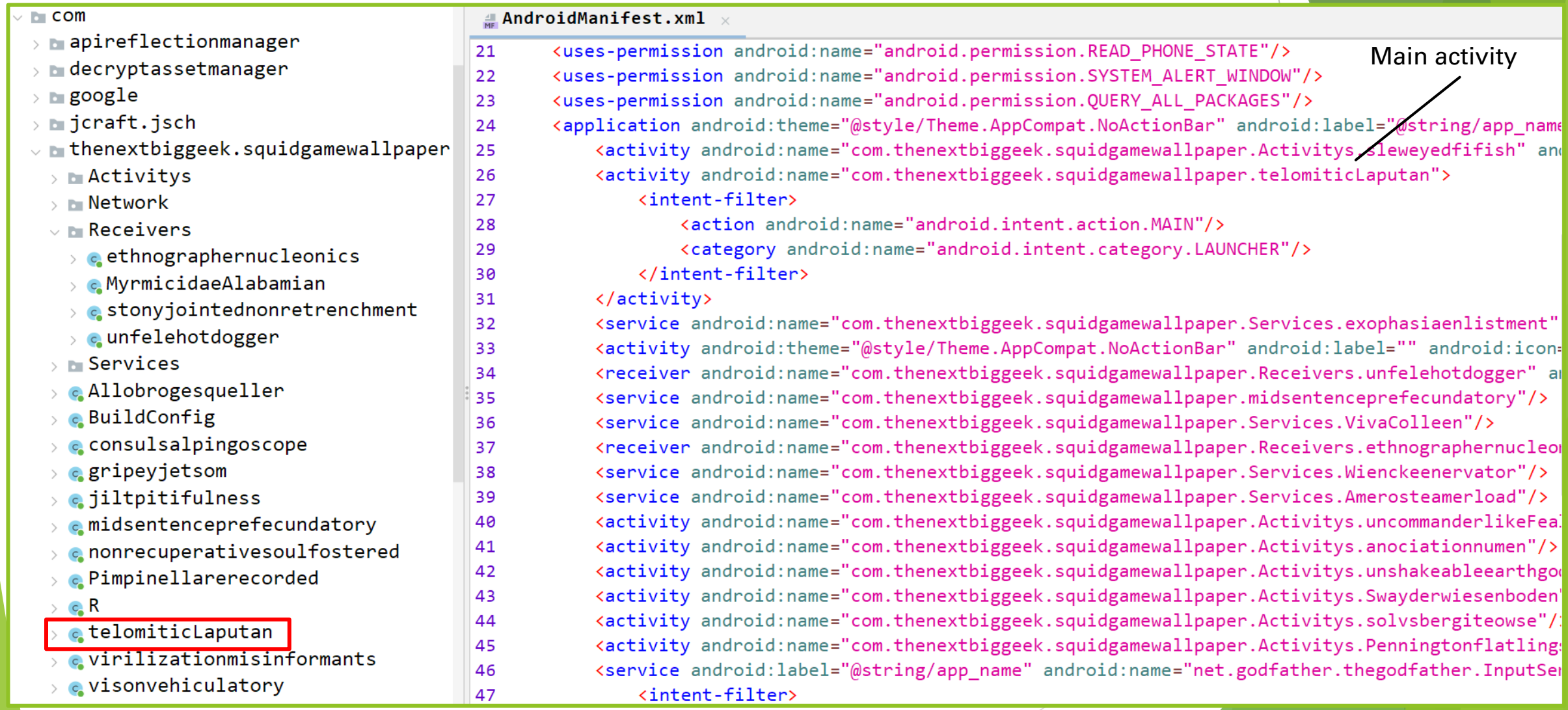


Android App Components

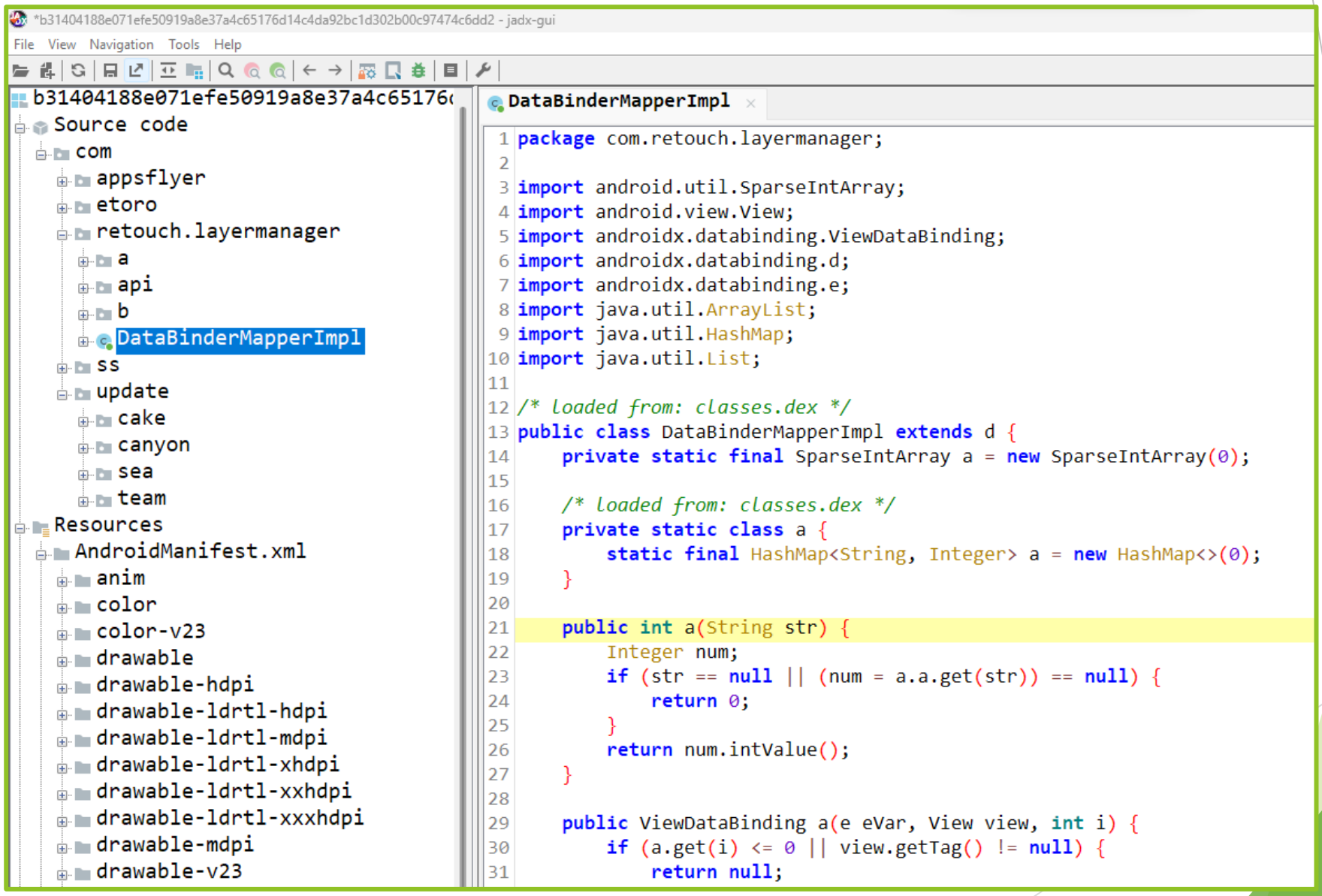
- Activities
- Services
- Receivers
- Content Providers

Common Tools for Android Analysis

Finding Entrypoints in the Manifest



Decompiling Managed Code



Case Study: SpyNote Malware

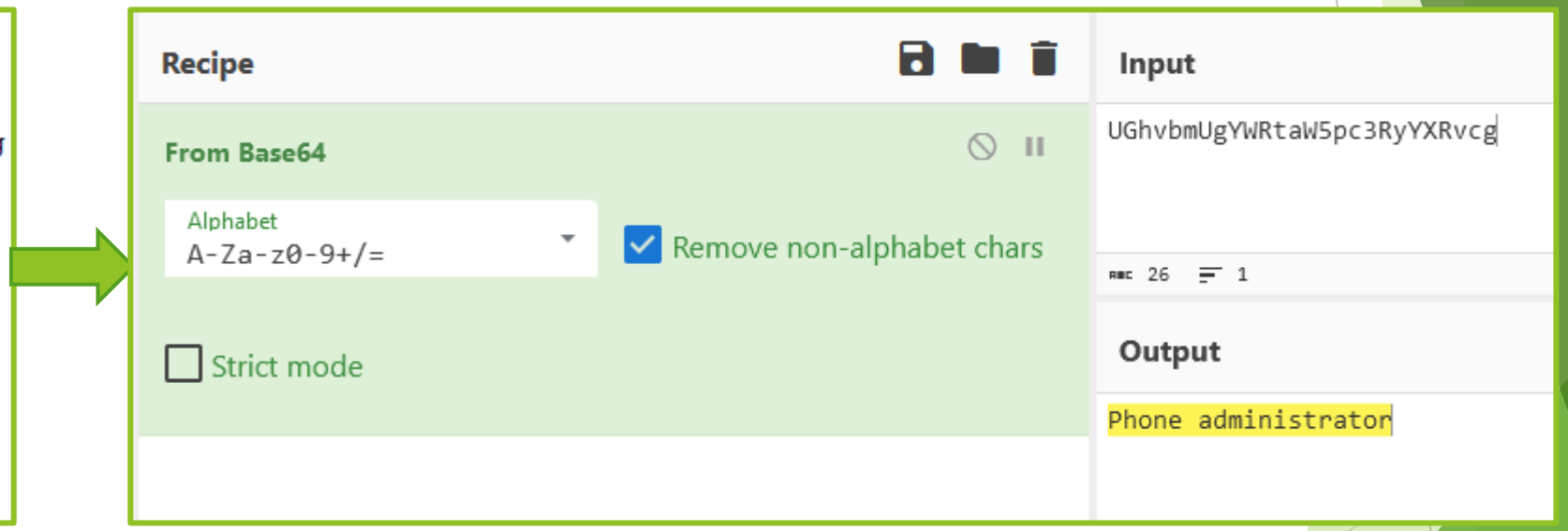
- Prevalent spyware family
- Distributed via SMS phishing campaigns
- Logs calls, SMS messages, keystrokes
- Records audio, screen, and calls
- SHA256: eec5096dfca6824317863f9225c29f6c4b3442c48fefa62dc382e3569bca5a60

Hands On: SpyNote Malware

Common Obfuscation Techniques in Android

String Encoding / Encryption

```
TWVzc2FnZXM
ZGV2aWNlIGFkbWluIGFwcA
bm90aWZpY2F0aW9ucw
UGhvbmUgYWRtaW5pc3RyYXRvcg
U3RhcnQgbm93
U3RhcnQgbm93
U3RhcnQgbm93
ZGV2aWNlIGFkbWlu
ZGV2aWNlIGFkbWlu
VXNlIHNlcnZpY2U
asadadad
asadadad
QXBwZWFyIG9uIHRvcA
b3ZlciBvdGhlciBhcHBz
```

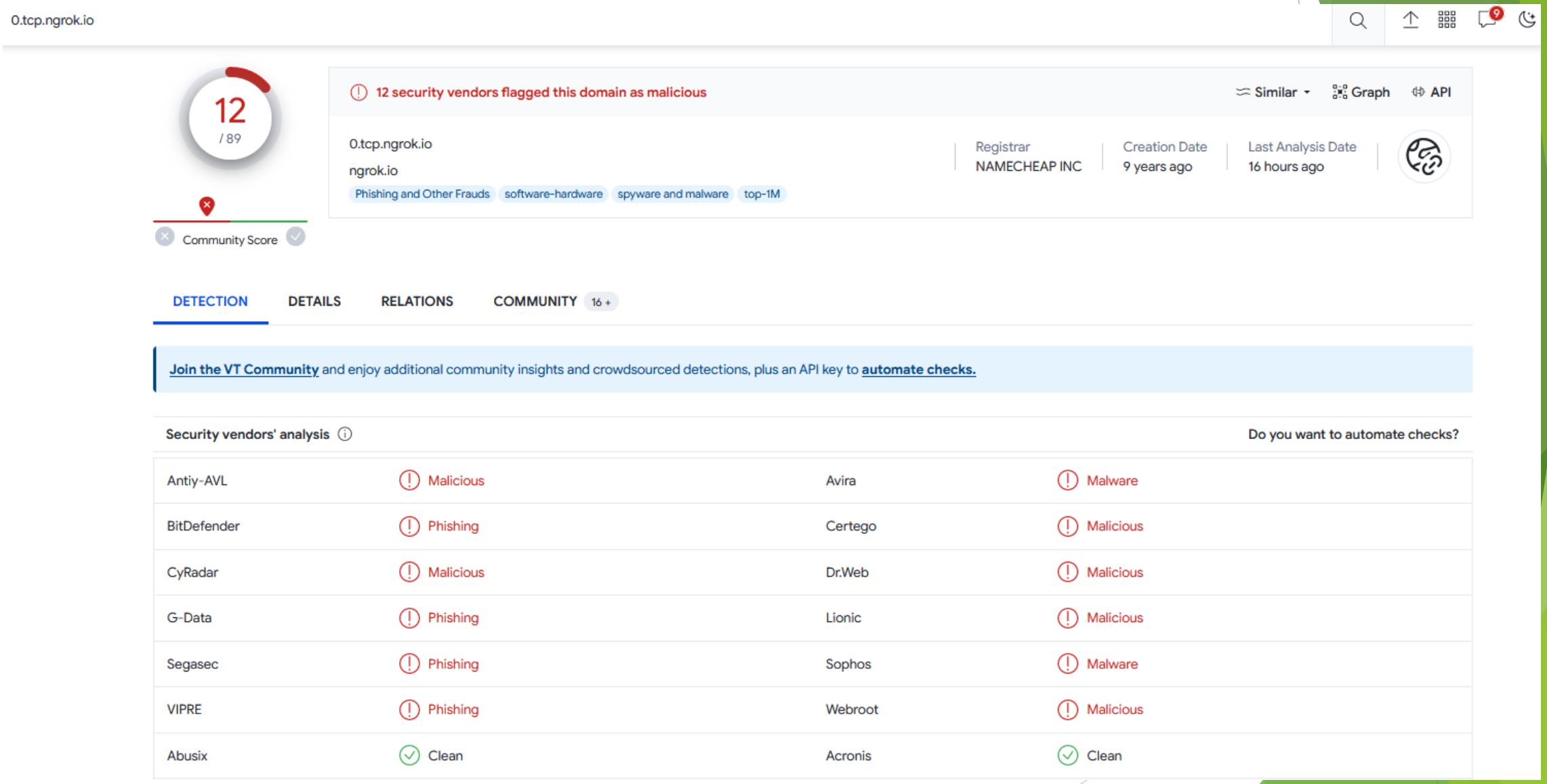


Anti-Emulation

```
String locate = Resources.getSystem().getConfiguratic
if (ArrayUtils.contains(this.mw_countriesExcludeLis
    finish();
} else if (this.mw_mainWorkClass.isEmulator()) {
} else {
    if (this.mw_mainWorkClass.PRead(this, "key") ==
```

Open-Source Detections and Rules

VirusTotal


0.tcp.ngrok.io
12
/ 89
Community Score
12 security vendors flagged this domain as malicious
Similar
Graph
API
0.tcp.ngrok.io
ngrok.io
Phishing and Other Frauds
software-hardware
spyware and malware
top-1M
Registrar
NAMECHEAP INC
Creation Date
9 years ago
Last Analysis Date
16 hours ago
DETECTION
DETAILS
RELATIONS
COMMUNITY 16 +
Join the VT Community and enjoy additional community insights and crowdsourced detections, plus an API key to automate checks.
Security vendors' analysis
Do you want to automate checks?
Antiy-AVL Malicious
Avira Malware
BitDefender Phishing
Certego Malicious
CyRadar Malicious
Dr.Web Malicious
G-Data Phishing
Lionic Malicious
Segasec Phishing
Sophos Malware
VIPRE Phishing
Webroot Malicious
Abusix Clean
Acronis Clean

Yara Rules

```
rule android_rat_androidTester : Android RAT {
  meta:
    author      = "@_lubiedo"
    date        = "2020-12-02"
    description = "Android Tester"
    malver      = "v.6.4.6"
    version     = "1.0"
  strings:
    $str00  = "Android Tester" fullword
    $str01  = "6.4.4" fullword
    $str02  = "device_admin" fullword
    $res03  = "res/drawable/abc_"
    $res04  = "res/layout/abc_"
  condition:
    uint32be(0) == 0x504B0304 // APK file signature
      and filesize < 1MB and (
        all of ($str*) and any of ($res*)
      )
}
```

Slides and Android RE Challenge

- Github repo with slides
- Android RE challenge!
  - Can you find the C2 in this SpyNote sample?
  - SHA256: 5c01f7727c78dea9c89dccf92b01b4c45e69406e64623407794014 97bf4d4589

https://github.com/LaurieWired/ReverseEngineeringAndroidMalware

Thank you!

Questions?