REVERSE ENGINEERING

Instrumenting the native layer of mobile apps

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ABOUT US

And everything following is our own opinion,
our methodologies,
our skills,
our passion
which is not related to what we do to in our company

- 7 years of cooking school. Not graduated.
- No technical backgrounds, didn't had the chance to attempt any trainings.

Growth with

- Open sourcing knowledge
- Passion
- Patience
- Google
- Community projects

Open sourcing

- Documentations
- Tutorials
- PDF
- Videos
- Keynotes

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My Journey

2016

* First MITM and approach to reverse engineering

* Maintainer - together with other guys - of the java API implementation for Pokémon Go (https://github.com/Grover-c13/PokeGOAPI-Java)

* Creator of **PokéMesh**

My Journey

2017–18

Break any attempt to protect **Supercell** games from a 3rd party client re-implementation

- Encryption logic
- Protocol structure
- Frida detection
- Arxan
    - CRC / Anti-Tamper jump (Thanks frida <3)
    - Single byte change on obfuscated blocks (Thanks unicorn / GDB <3)
    - Strings encryption logic

:[*fun, challenge*] => [*improvements, sharing knowledge*]

My Journey

2017–18

Bandai NAMCO - **Dragon Ball Z Dokkan Battle**

Tencent - **Arena of Valor**

Tencent - **PUBG Mobile**

Netmarble - **Lineage2**

Ludia - **Jurassic World Alive**

- Encryption logic
- Protocol structure
- Protections
- Whatever

:[*fun, challenge*]

Reverse Engineering

WHAT'S YOUR GOAL?

HiB?

- We can't speak about what we love to do with our girlfriends / parents
- Someone believes we do cool stuffs
- We play fair
- It's about dedication
- Spreading open sourcing and sharing knowledge
- Get in touch with awesome people that give us hints and suggestions

Environment

- **A decompiler** (IDA, Hopper, Binary Ninja, Radare...)
- **Dynamic instrumentation**
  Frida (https://www.frida.re)
- **Debugging**
  GDB (https://developer.android.com/ndk/downloads/index.html)
  Gef (https://github.com/hugsy/gef)
- **Emulation**
  Unicorn (https://github.com/unicorn-engine/unicorn)
  uDdbg (https://github.com/iGio90/uDdbg)

- **OnePlus 5T - Android 8 (Rooted)**
  Frida
  GDB
- **Lenovo P2 - Android 7 (Rooted)**
  Frida
  GDB
- **iPhone 6s - iOS11 (Jailbroken)**
  Frida
  LLDB

…Environment

- Coffee
- A bunker somewhere in the desert, shipped with strong silent weapons that will burn any bees flying around

Stickers on the wall:

- Random DOES NOT exists
- Use always the fastest way... ALWAYS... (don't waste time)

To complete the env...

...on Android

1) Download the APK of the target
2) Unzip to access the content

- APK files can be eventually grabbed from /data/app/target_package_name/

Additional resources

* **apktool** := to extract resources
https://ibotpeaches.github.io/Apktool/

* **dex2jar** := to convert the APK into a jar := plain java sources
https://github.com/pxb1988/dex2jar

To complete the env...

...on iOS

1) Dump the decrypted IPA

https://github.com/AloneMonkey/frida-ios-dump

2) Unzip to access the content

Logical approach

1) Understanding the source of network requests and data serialization
* hooking low level functions
* backtracing

2) Are you trying to prevent instrumentation?

3) Build a proxy server

4) Understanding encryptions / hash logic

5) Understanding the structure of the protocol buffers (from raw bytes)
* through static analysis or by reverse engineering

6) Build your client

7) Make your life easier for the next session (improve)

8) Repeat

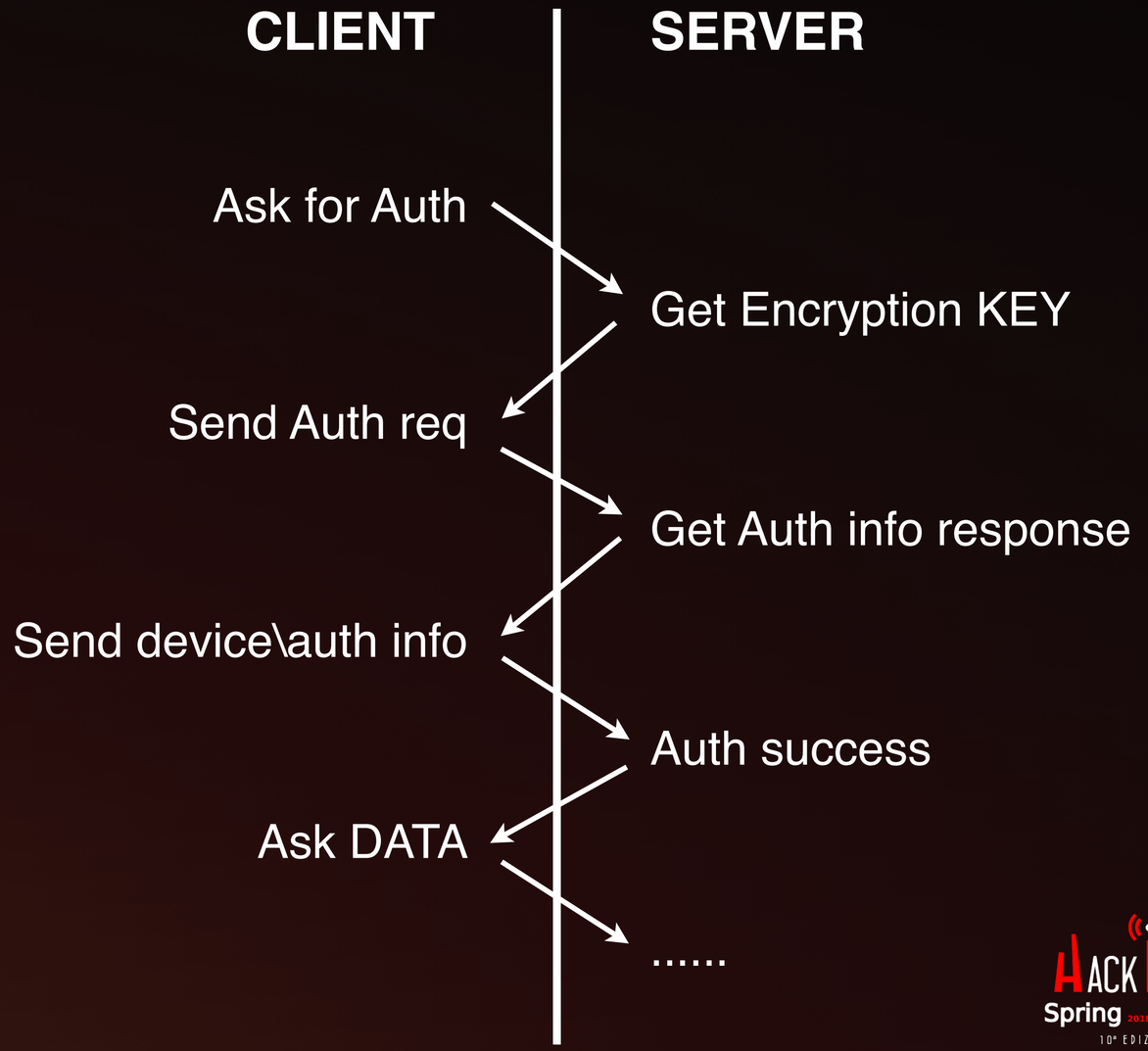
Table of content

- Reading network requests
- Bypassing protections
- Tips & Tricks
- Build an own implementation of general purpose functions
- Navigating through obfuscation
- Data serialization
- Creating phisical cracks using the same approach

DEMO

Communication example


```
▼ object {2}
  ▼ headers {9}
      magic : 13158
      head_version : 8
      body_version : 8
      command : 16403
      is_response : ☐ false
      sequence : 112
      head_len : 22
      body_len : 32
      compressed : ☐ false
  ▼ body_decoded {2}
    ▼ data_head {4}
        command_id : 1302
        magic : 1323
        rsp_seq : 341
        req_seq : 35
      data_body : 005ad7482b0000000000747366346706
```

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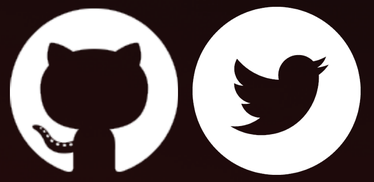
THANKS!

Get in touch!


/iGio90


/rEDSAMK


SecRet - https://discord.gg/hTVhy3V

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OVERWOLF

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