Let's Sink The Phishermen's Boat!

=DEFCON 16 @ Las Vegas, Nevada=

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F-Secure Corporation



Why this topic?

- Internet banking has become more and more preferred choice
- Yet, many people don't understand the risk they are facing in online banking

Do you think the following practices protect you from phishing attack?

- Keep antivirus software updated
- Use online banking on SSL-enabled websites only
- Use online banking on trusted machine only
- Use 2-factor authentication security feature
- Use latest web browser with fully patched plug-ins

Answer is NO!

Online banking usage at record high

By Richard Gluyas
October 10, 2007 12:00am

- **A record 31 per cent of customers banked online in June quarter**
- **Online transfers also at all time high**
- **Despite online uptick, banks are expanding branches**

INTERNET banking usage rose to a new record of 31 per cent of all bank customers in the June quarter, according to data compiled by MISC Australia on behalf of its client banks.

The 1.4 per cent increase, which is equivalent to 90,000 extra users, reversed the 1.3 per cent decline in the March quarter.

The latest result was helped by a general surge in internet banking, with customers expanding their deposit balances and opening new accounts, including superannuation accounts, as a result of the one-off opportunity to pour a maximum of $1 million into super before lower caps were introduced on July 1.

Figures released late last month by the financial services industry regulator, the Australian Prudential Regulation Authority, showed investors put $22.4 billion of voluntary contributions into super in the June quarter.

This was more than triple the previous highest level, such that voluntary payments were higher than employer contributions for the first time.

MISC Australia said that record usage of internet banking, available now for seven years, showed there was a growing acceptance of virtual banking in the community.

Source: http://www.news.com.au/business/story/0,23636,22561818-5013952,00.html

How serious now?

- Billion dollar losses caused by phishing attacks
- Banks can't simply reverse transactions - legal issues

Gartner Survey Shows Phishing Attacks Escalated in 2007; More than $3 Billion Lost to These Attacks

Debit Cards Emerged as the Financial Instrument Targeted Most by Fraudsters

STAMFORD, Conn., December 17, 2007 — Phishing attacks in the United States soared in 2007 as $3.2 billion was lost to these attacks, according to a survey by Gartner, Inc. The survey found that 3.6 million adults lost money in phishing attacks in the 12 months ending in August 2007, as compared with the 2.3 million who did so the year before.

According to a survey of more than 4,500 online U.S. adults in August 2007 (which was representative of the online U.S. adult population) the attacks were more successful in 2007 than they were in the previous two years. Of consumers who received phishing e-mails in 2007, 3.3 percent say they lost money because of the attack, compared with 2.3 percent who lost money in 2006, and 2.9 percent who did so in 2005, according to similar Gartner surveys during those years.

"Phishing attacks are becoming more surreptitious and are often designed to drop malware that steals user credentials and sensitive information from consumer desktops," said Avivah Litan, vice president and distinguished analyst at Gartner. "Anti-phishing detection and prevention solutions are available but not utilized widely enough to stop the damage. These must be deployed and combined with solutions that also proactively detect and stop malware-based attacks."

"Customer-facing organizations cannot expect their customers' desktops to be protected from malicious code, nor from e-mail and/or advertising traps that lure innocent consumers to Web sites that turn out to be infection points," Ms. Litan said. "In fact, 11 percent of online adults say they don't use any security software (such as antivirus or anti-spyware products) on their desktop, and another 45 percent only use what they can get for free."

The average dollar loss per incident declined to $886 from $1,244 lost on average in 2006 (with a median loss of $200 in 2007), but because there were more victims, $3.2 billion was lost to phishing in 2007, according to surveyed consumers. There was a bit of relative good news, however; the amounts that consumers were able to recover also increased. Some 1.6 million adults recovered about 64 percent of their losses in 2007, up from the 54 percent that 1.5 million adults recovered in 2006.

PayPal and eBay continue to be the most-spoofed brands, but phishing attacks increasingly employ devious social engineering attacks, impersonating, for example, electronic greeting cards, charities and foreign businesses.

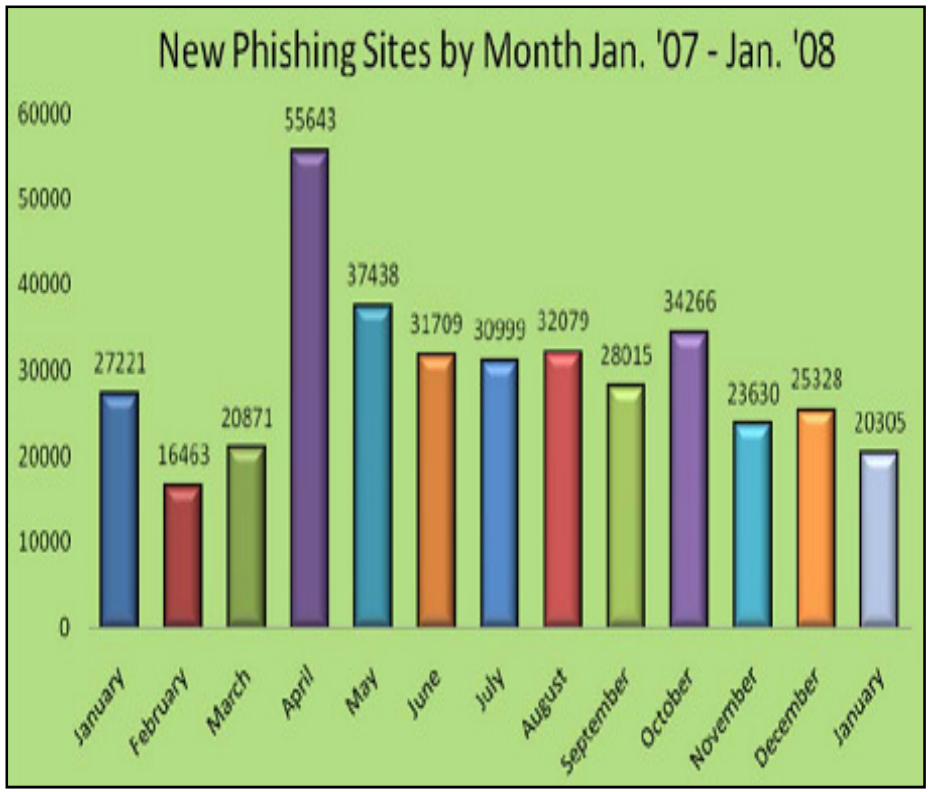
Thieves are increasingly stealing debit card and other bank account credentials to rob accounts — targeting areas where fraud detection is weaker than it is with credit card accounts. According to the survey, of those consumers who lost money to phishing attacks, 47 percent said a debit or check card had been the payment method used when they lost money or had unauthorized charges made on their accounts. This was followed by 32 percent of respondents who listed a credit card as the payment method, and 24 percent who listed a bank account as the method (multiple responses were allowed).

"Criminals have stepped up attacks on debit card and bank accounts, where back-end fraud detection systems are traditionally weaker than they are with credit card accounts," Ms. Litan said. "Fraud detection and authentication systems deployed widely in online banking in response to FFIEC banking regulator guidance are already a step behind fraudsters' latest techniques and must be updated to guard against browser hijackings, "man in the middle," and other hidden malware-based attacks often delivered to users through phishing e-mails. Regulators must get a better handle on the problem through consistent and timely bank reporting on their fraud incidents and losses."

Source:
http://www.gartner.com/it/page.jsp?id=565125&format=print

How serious now?

- Currently, there is no complete automated solution to detect phishing accurately
- It is all over the world targeting different nationalities and different banks!
- Phishing techniques used are getting more sophisticated than before





Source: http://www.antiphishing.org/reports/apwg_report_jan_2008.pdf

Commonly used techniques in phishing



- DNS modification / cache poisoning a.k.a. pharming
- HTML / Javascript content with visual similarity (even Flash-based)
- Spoofed source email address
- ARP poisoning to redirect traffic
- API hooking (user mode / kernel mode)
- Browser plug-in (BHO mainly targeting Internet Explorer)
- Similar URLs / obfuscated encodings
- Hosting websites on fast flux network (usually botnet machines)
- Uses drive-by downloads to infect Trojan via software vulnerability

Flash-based phishing website

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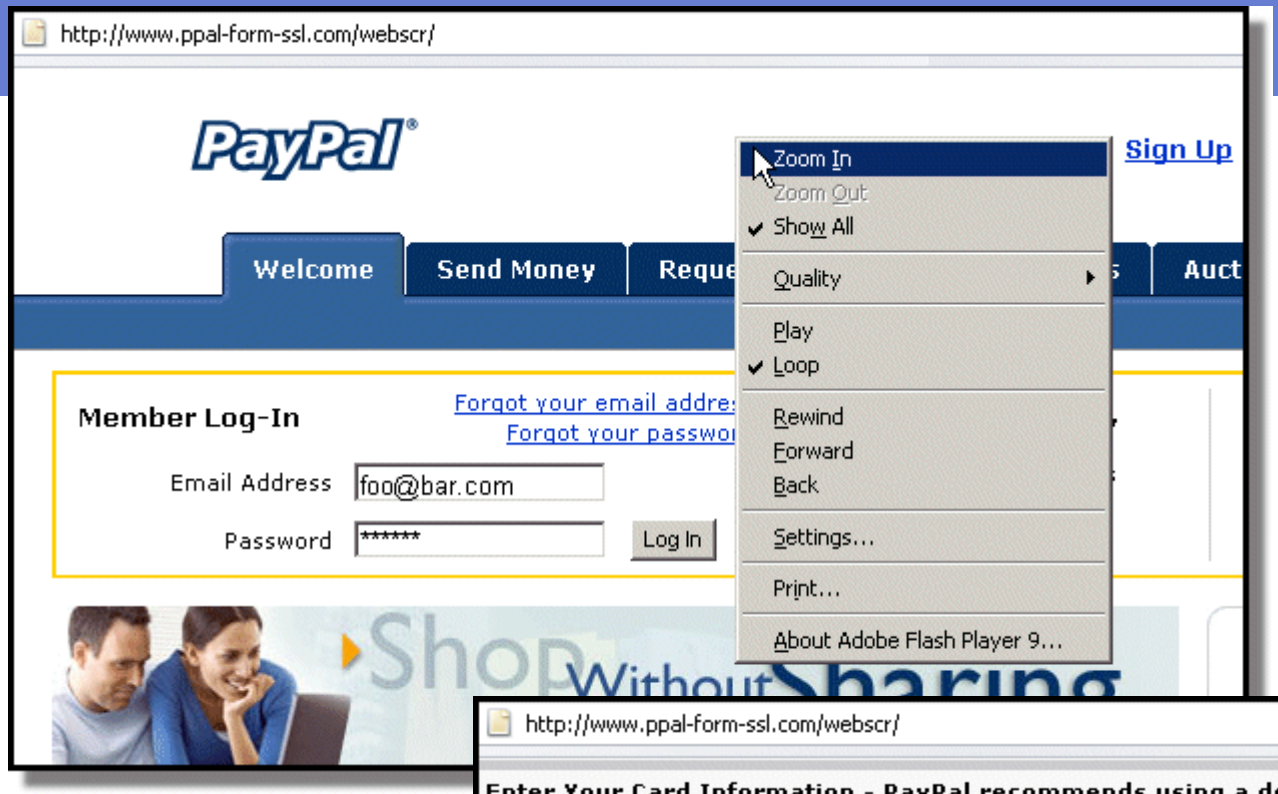

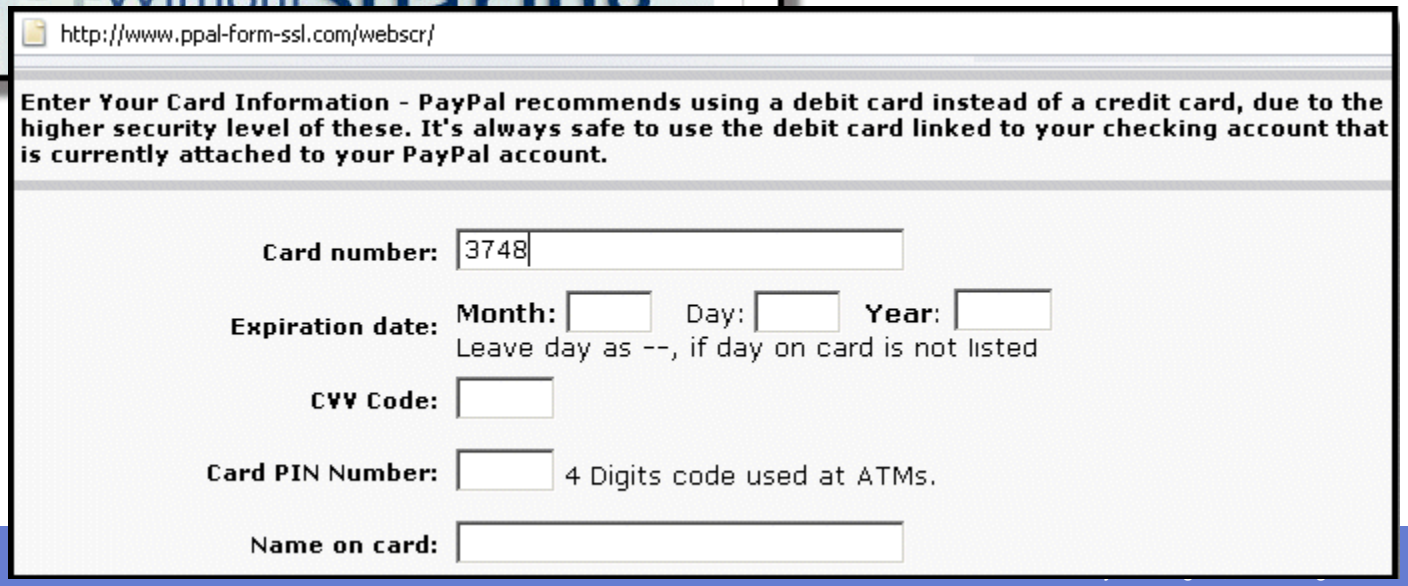

Source:
http://www.f-secure.com/weblog/archives/00001066.html

Example 1: Website with drive-by download



Analysis report of drive-by download website

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2008/05/17 18:44:31 - [UTCD-INFO] Target: http://www.mongoliatourism.gov.mn/
2008/05/17 18:44:31 - [UTCD-INFO] Priority Level: 5
2008/05/17 18:44:31 - [UTCD-INFO] UMS's URL ID: 3643208
2008/05/17 18:44:31 - [UTCD-INFO] HTTP Request Metadata: null
2008/05/17 18:44:31 - [UTCD-INFO] Remaining Failure Retry: 3
2008/05/17 18:44:31 - [UTCD-INFO] URL Type: Web browser interpretable URL
2008/05/17 18:44:32 - [UTCD-INFO] Content-Type: text/html
2008/05/17 18:44:32 - [UTCD-INFO] Server Date: Sat, 17 May 2008 09:36:16 GMT
2008/05/17 18:44:32 - [UTCD-INFO] Server Type: Apache/2.2.8 (Unix)
2008/05/17 18:44:32 - [GOAT-INFO] WXPSP2-1: Windows XP Pro SP2 + Firefox 1.0 and IE6
2008/05/17 18:44:32 - [GOAT-INFO] IE6/IE7 = Enabled, Firefox1/2 = Enabled
2008/05/17 18:44:32 - [GOAT-INFO] Network IO Check Interval = 5secs
2008/05/17 18:44:32 - [GOAT-INFO] Network IO Activity Tolerance = 512bytes
2008/05/17 18:44:32 - [UTCD-INFO] Sending URL to UAE for automated analysis...
2008/05/17 18:44:32 - [UTCD-INFO] Analyzing website in VMware goat environment...
2008/05/17 18:46:29 - [UTCD-INFO] Time elapsed 1 minutes and 57 seconds
2008/05/17 18:46:31 - [UTCD-INFO] Goat Process ID: 1636
2008/05/17 18:46:31 - [UTCD-INFO] IE6/7 Process ID: 1668
2008/05/17 18:46:31 - [UTCD-INFO] FireFox 1/2 Process ID: 1676
2008/05/17 18:46:31 - [UTCD-INFO] Pop-up Window(s) Found: 0
2008/05/17 18:46:31 - [UTCD-INFO] Analyzing tracer log... (2,363,042 bytes)
2008/05/17 18:46:31 - [UTCD-INFO] Time elapsed 0.102503061295 second
2008/05/17 18:46:31 - [UTCD-INFO] Exploited web browser: Internet Explorer
2008/05/17 18:46:31 - [UTCD-INFO] Suspicious folder creation count: 0
2008/05/17 18:46:31 - [UTCD-INFO] Suspicious file creation count: 3
2008/05/17 18:46:31 - [UTCD-INFO] Suspicious registry key creation count: 6
2008/05/17 18:46:31 - [UTCD-INFO] Suspicious process creation count: 4
2008/05/17 18:46:31 - [UTCD-INFO] Threat percentage: 100%
2008/05/17 18:46:31 - [UTCD-INFO] Conclusion: Malicious

===== DEBUG INFORMATION - GOAT MACHINE CHANGES =====
{'createdir': [],
'createfile': [
{'file': '%windir%\\system32\\drivers\\qdm33.sys'},
{'file': '%windir%\\system32\\winctrl32.dll'},
{'file': 'c:\\6lwxsu.exe'}],
'createkey': [
{'key': '%hkcu%\\s-1-5-21-1343024091-1417001333-839522115-1003\\parameters'},
{'key': '%hkcu%\\s-1-5-21-1343024091-1417001333-839522115-1003\\rfc1156agent'},
{'key': '%hklm%\\software\\microsoft\\windows nt\\currentversion\\drivers32\\controlset002'},
{'key': '%hklm%\\software\\microsoft\\windows nt\\currentversion\\drivers32\\qdm33'},
{'key': '%hklm%\\system\\currentcontrolset\\services\\qdm33'},
{'key': '%hklm%\\system\\currentcontrolset\\services\\security'}],
'newproc': [
{'1344,532': '%windir%\\system32\\cmd.exe'},
{'1392,1264': '%windir%\\system32\\svchost.exe'},
{'1392,1344': '%temp\\bn7.tmp'},
{'1668,1392': 'c:\\6lwxsu.exe'}]}
===== DEBUG INFORMATION - GOAT MACHINE CHANGES ======

Example 2: Website with drive-by download



Analysis report of drive-by download website



2008/06/26 05:30:37 - [UTCD-INFO] Target: http://scit.hit.edu.cn/design/ShowArticle.asp?ArticleID=976
2008/06/26 05:30:37 - [UTCD-INFO] Priority Level: 5
2008/06/26 05:30:37 - [UTCD-INFO] UMS's URL ID: 5088202
2008/06/26 05:30:37 - [UTCD-INFO] HTTP Request Metadata: null
2008/06/26 05:30:37 - [UTCD-INFO] Remaining Failure Retry: 3
2008/06/26 05:30:37 - [UTCD-INFO] URL Type: Web browser interpretable URL
2008/06/26 05:30:38 - [UTCD-INFO] Content Length: 23,163 bytes
2008/06/26 05:30:38 - [UTCD-INFO] Content-Type: text/html
2008/06/26 05:30:38 - [UTCD-INFO] Server Date: Wed, 25 Jun 2008 21:33:09 GMT
2008/06/26 05:30:38 - [UTCD-INFO] Server Type: Microsoft-IIS/5.0
2008/06/26 05:30:38 - [GOAT-INFO] WXPSP2-2: Windows XP Pro SP2 + Firefox 2.0 and IE 7.0
2008/06/26 05:30:38 - [GOAT-INFO] IE6.0/IE7.0 = Enabled, Firefox1.0/2.0 = Enabled
2008/06/26 05:30:38 - [GOAT-INFO] Network IO Check Interval = 5secs
2008/06/26 05:30:38 - [GOAT-INFO] Network IO Activity Tolerance = 512bytes
2008/06/26 05:30:38 - [UTCD-INFO] Sending URL to UAE for automated analysis...
2008/06/26 05:30:38 - [UTCD-INFO] Analyzing website in VMware goat environment...
2008/06/26 05:32:15 - [UTCD-INFO] Time elapsed 1 minutes and 37 seconds
2008/06/26 05:32:15 - [UTCD-INFO] Goat Process ID: 1728
2008/06/26 05:32:15 - [UTCD-INFO] IE 6.0/7.0 Process ID: 8368
2008/06/26 05:32:15 - [UTCD-INFO] FireFox 1.0/2.0 Process ID: 8392
2008/06/26 05:32:15 - [UTCD-INFO] Pop-up Window(s) Found: 0
2008/06/26 05:32:16 - [UTCD-INFO] Analyzing tracer log... (20,669,663 bytes)
2008/06/26 05:32:16 - [UTCD-INFO] Time elapsed 0.760082960129 second
2008/06/26 05:32:16 - [UTCD-INFO] Exploited web browser: IE and Firefox
2008/06/26 05:32:16 - [UTCD-INFO] Suspicious folder creation count: 0
2008/06/26 05:32:16 - [UTCD-INFO] Suspicious file creation count: 7
2008/06/26 05:32:16 - [UTCD-INFO] Suspicious registry key creation count: 35
2008/06/26 05:32:16 - [UTCD-INFO] Suspicious process creation count: 4
2008/06/26 05:32:16 - [UTCD-INFO] Threat percentage: 100%
2008/06/26 05:32:16 - [UTCD-INFO] Conclusion: Malicious

…continued

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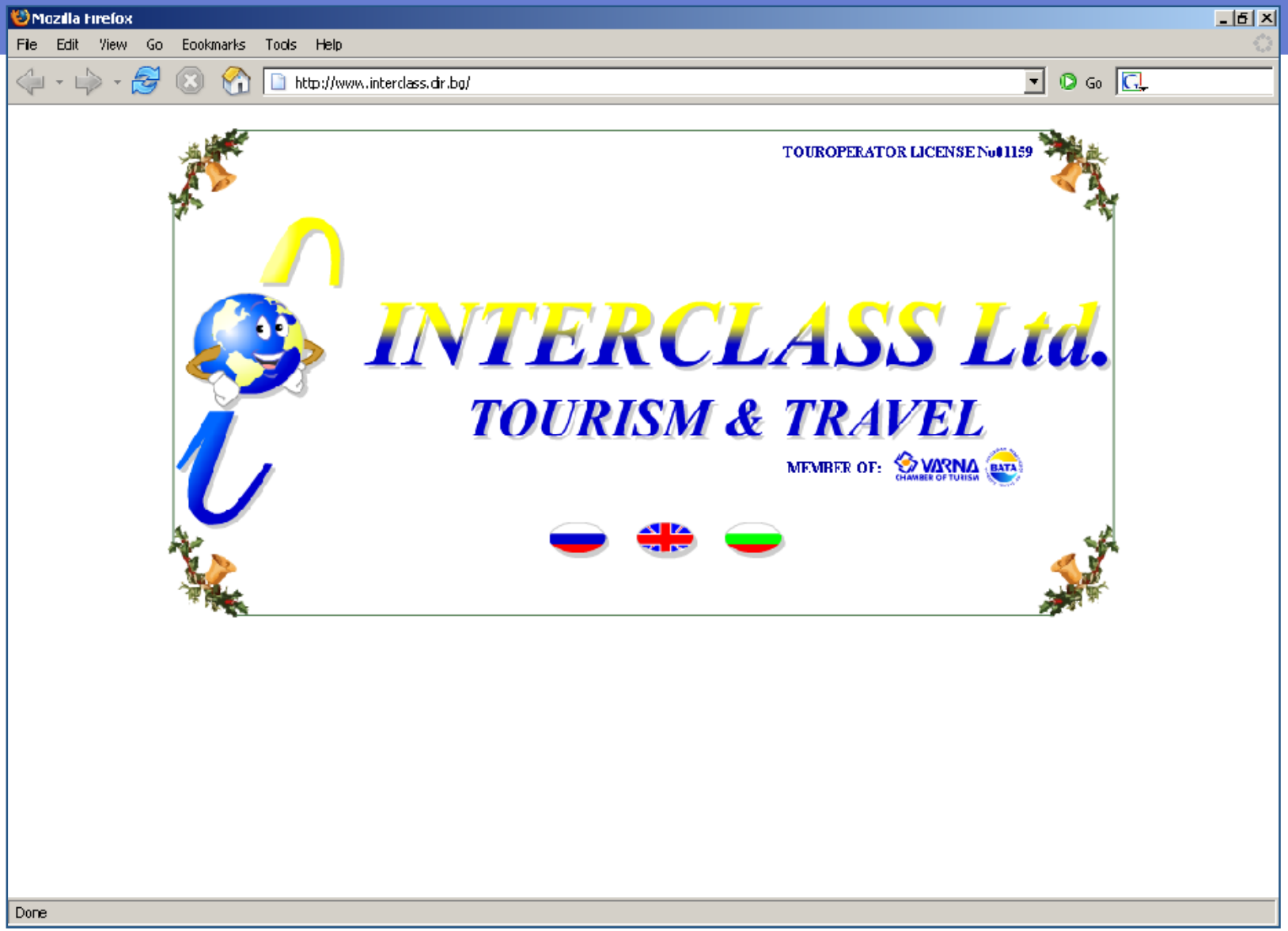
```
====================== DEBUG INFORMATION - GOAT MACHINE CHANGES ======================
{'createdir': [],
 'createfile': [
                {'file': '%internetcache%\\5ps8r2b2\\ko[1].exe'},
                {'file': '%internetcache%\\6q9hncm8\\ko[1].exe'},
                {'file': '%temp%\\orz.exe'},
                {'file': '%windir%\\kdsv.exe'},
                {'file': '%windir%\\system32\\drivers\\ntdapi.sys'},
                {'file': '%windir%\\ugvq.exe'},
                {'file': 'c:\\mahtesf3.bat'}],
 'createkey': [
               {'key': '%hkcu%\\ntdapi'},
               {'key': '%hkcu%\\s-1-5-21-1343024091-1417001333-839522115-1003\\avs'},
               {'key': '%hkcu%\\s-1-5-21-1343024091-1417001333-839522115-1003\\software\\microsoft\\windows nt\\currentversion\\image file execution options\\qqdoctor.exe'},
               {'key': '%hkcu%\\s-1-5-21-1343024091-1417001333-839522115-1003\\software\\microsoft\\windows nt\\currentversion\\image file execution
options\\qqdoctormain.exe'},
               {'key': '%hklm%\\software\\microsoft\\windows nt\\currentversion\\windows\\clsid\\{a9895933-6636-4281-bc58-ee6de2af96e3}\\inprocserver32'},
               {'key': '%hklm%\\software\\microsoft\\windows nt\\currentversion\\windows\\clsid\\{dc3d30ae-0380-4151-8934-ee98a34b0370}\\inprocserver32'},
               {'key': '%hklm%\\software\\microsoft\\windows nt\\currentversion\\windows\\explorer'},
               {'key': '%hklm%\\software\\microsoft\\windows nt\\currentversion\\windows\\inprocserver32'},
               {'key': '%hklm%\\software\\microsoft\\windows nt\\currentversion\\windows\\inprocserver32'},
               {'key': '%hklm%\\software\\microsoft\\windows nt\\currentversion\\windows\\inprocserver32'},
               {'key': '%hklm%\\software\\microsoft\\windows nt\\currentversion\\windows\\inprocserver32'},
               {'key': '%hklm%\\software\\microsoft\\windows nt\\currentversion\\windows\\software\\microsoft\\windows\\currentversion\\explorer\\browser helper
objects\\{55694105-5108-9405-3695-954187462155}'},
               {'key': '%hklm%\\software\\microsoft\\windows nt\\currentversion\\windows\\software\\microsoft\\windows\\currentversion\\explorer\\browser helper
objects\\{5a069845-2036-6084-9054-6087502480a5}'},
               {'key': '%hklm%\\software\\microsoft\\windows nt\\currentversion\\windows\\software\\microsoft\\windows\\currentversion\\explorer\\browser helper
objects\\{7c8d1401-a58d-a81c-cd24-a5915c4517c7}'},
               {'key': '%hklm%\\software\\microsoft\\windows nt\\currentversion\\windows\\software\\microsoft\\windows\\currentversion\\explorer\\browser helper
objects\\{b490415f-65f8-b5c5-d8ba-9405fb12054b}'},
               {'key': '%hklm%\\software\\microsoft\\windows nt\\currentversion\\windows\\windows'},
               {'key': '%hklm%\\system\\currentcontrolset\\control\\nls\\locale\\alternate sorts\\{7a041f13-a111-12a3-b0cf-f99818aa68a7}'},
               {'key': '%hklm%\\system\\currentcontrolset\\control\\nls\\locale\\alternate sorts\\{7c8d1401-a58d-a81c-cd24-a5915c4517c7}'},
               {'key': '%hklm%\\system\\currentcontrolset\\control\\nls\\locale\\alternate sorts\\{a629ff4f-acdb-5c90-a098-facb3456a26a}'},
               {'key': '%hklm%\\system\\currentcontrolset\\control\\nls\\locale\\alternate sorts\\{b490415f-65f8-b5c5-d8ba-9405fb12054b}'}],
 'newproc': [
             {'8196,8484': '%windir%\\kdsv.exe'},
             {'8368,8964': '%temp\\orz.exe'},
             {'8392,8196': '%temp\\orz.exe'},
             {'8964,8268': '%windir%\\ugvq.exe'}]}
====================== DEBUG INFORMATION - GOAT MACHINE CHANGES ======================
```

Infected Virtual Machine analysis log file

```
2008-06-25 14:32:12 : Enumerating window handle(s)...
2008-06-25 14:32:12 : [WINDOW] TF_FloatingLangBar_WndTitle
2008-06-25 14:32:12 : [WINDOW] CiceroUIWndFrame
2008-06-25 14:32:12 : [WINDOW] Start Menu
2008-06-25 14:32:12 : [WINDOW] DLLUP
2008-06-25 14:32:12 : [WINDOW] DLLUP
2008-06-25 14:32:12 : [WINDOW] Auto Suggest Drop-Down
2008-06-25 14:32:12 : [WINDOW] SysFader
2008-06-25 14:32:12 : [WINDOW] Connections Tray
2008-06-25 14:32:12 : [WINDOW] Power Meter
2008-06-25 14:32:12 : [WINDOW] MS_WebcheckMonitor
2008-06-25 14:32:12 : [WINDOW] ??Brunnel??Dr. Wang Zidong????????! - Mozilla Firefox
2008-06-25 14:32:12 : [WINDOW] Goat Initialization
2008-06-25 14:32:12 : [WINDOW] ??Brunnel??Dr. Wang Zidong????????! - Windows Internet Explorer
2008-06-25 14:32:12 : [WINDOW] Acrobat IEHelper
2008-06-25 14:32:12 : [WINDOW] DDE Server Window
2008-06-25 14:32:12 : [WINDOW] NetscapeDispatchWnd
2008-06-25 14:32:12 : [WINDOW] XPCOM:EventReceiver
2008-06-25 14:32:12 : [WINDOW] GDI+ Window
2008-06-25 14:32:12 : [WINDOW] Program Manager
```

Malware windows handle

Example 3: Website with drive-by download



Analysis report of drive-by download website

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```
2008/05/21 16:52:19 - [UTCD-INFO] Target: http://www.interclass.dir.bg/
2008/05/21 16:52:19 - [UTCD-INFO] Priority Level: 5
2008/05/21 16:52:19 - [UTCD-INFO] UMS's URL ID: 365
2008/05/21 16:52:19 - [UTCD-INFO] Remaining Failure Retry: 3
2008/05/21 16:52:20 - [UTCD-INFO] URL Type: Web browser interpretable URL
2008/05/21 16:52:20 - [UTCD-INFO] Content Length: 1,540 bytes
2008/05/21 16:52:20 - [UTCD-INFO] Content-Type: text/html
2008/05/21 16:52:20 - [UTCD-INFO] Server Date: Wed, 21 May 2008 08:52:19 GMT
2008/05/21 16:52:20 - [UTCD-INFO] Server Type: Zeus/4.3
2008/05/21 16:52:20 - [UTCD-INFO] Last Modified: Tue, 20 May 2008 09:17:55 GMT
2008/05/21 16:52:20 - [GOAT-INFO] WXPSP2-1: Windows XP Pro SP2 + Firefox 1.0 and IE 6.0
2008/05/21 16:52:20 - [GOAT-INFO] IE6.0/IE7.0 = Enabled, Firefox1.0/2.0 = Enabled
2008/05/21 16:52:20 - [GOAT-INFO] Network IO Check Interval = 5secs
2008/05/21 16:52:20 - [GOAT-INFO] Network IO Activity Tolerance = 512bytes
2008/05/21 16:52:20 - [UTCD-INFO] Sending URL to UAE for automated analysis...
2008/05/21 16:52:20 - [UTCD-INFO] Analyzing website in VMware goat environment...
2008/05/21 16:52:50 - [UTCD-INFO] Time elapsed 0 minutes and 30 seconds
2008/05/21 16:52:50 - [UTCD-INFO] Goat Process ID: 1648
2008/05/21 16:52:50 - [UTCD-INFO] IE 6.0/7.0 Process ID: 840
2008/05/21 16:52:50 - [UTCD-INFO] FireFox 1.0/2.0 Process ID: 1768
2008/05/21 16:52:50 - [UTCD-INFO] Pop-up Window(s) Found: 0
2008/05/21 16:52:50 - [UTCD-INFO] Analyzing tracer log... (766,680 bytes)
2008/05/21 16:52:50 - [UTCD-INFO] Time elapsed 0.0320420265198 second
2008/05/21 16:52:50 - [UTCD-INFO] Exploited web browser: Internet Explorer
2008/05/21 16:52:50 - [UTCD-INFO] Suspicious folder creation count: 0
2008/05/21 16:52:50 - [UTCD-INFO] Suspicious file creation count: 4
2008/05/21 16:52:50 - [UTCD-INFO] Suspicious registry key creation count: 1
2008/05/21 16:52:50 - [UTCD-INFO] Suspicious process creation count: 5
2008/05/21 16:52:50 - [UTCD-INFO] Threat percentage: 100%
2008/05/21 16:52:50 - [UTCD-INFO] Conclusion: Malicious
```

```
===== DEBUG INFORMATION - GOAT MACHINE CHANGES =====
{'createdir': [],
 'createfile': [
            {'file': '%temp%\\frame2_276.exe'},
            {'file': '%temp%\\liar3.exe'},
            {'file': '%windir%\\system32\\drivers\\qandr.sys'},
            {'file': 'c:\\documents and settings\\user\\win.exe'}],
 'createkey': [
             {'key': '%hklm%\\system\\currentcontrolset\\services\\security'}],
 'newproc': [
          {'1276,1464': '%windir%\\system32\\net1.exe'},
          {'536,1276': '%windir%\\system32\\net.exe'},
          {'536,360': '%temp\\frame2_276.exe'},
          {'536,492': '%temp\\liar3.exe'},
          {'840,536': 'c:\\documents and settings\\user\\win.exe'}]}
===== DEBUG INFORMATION - GOAT MACHINE CHANGES =====
```

What is the malware most likely trying to do?

[CLUE] <C:\> net start…

Example 4: Website with drive-by download



Analysis report drive-by download website



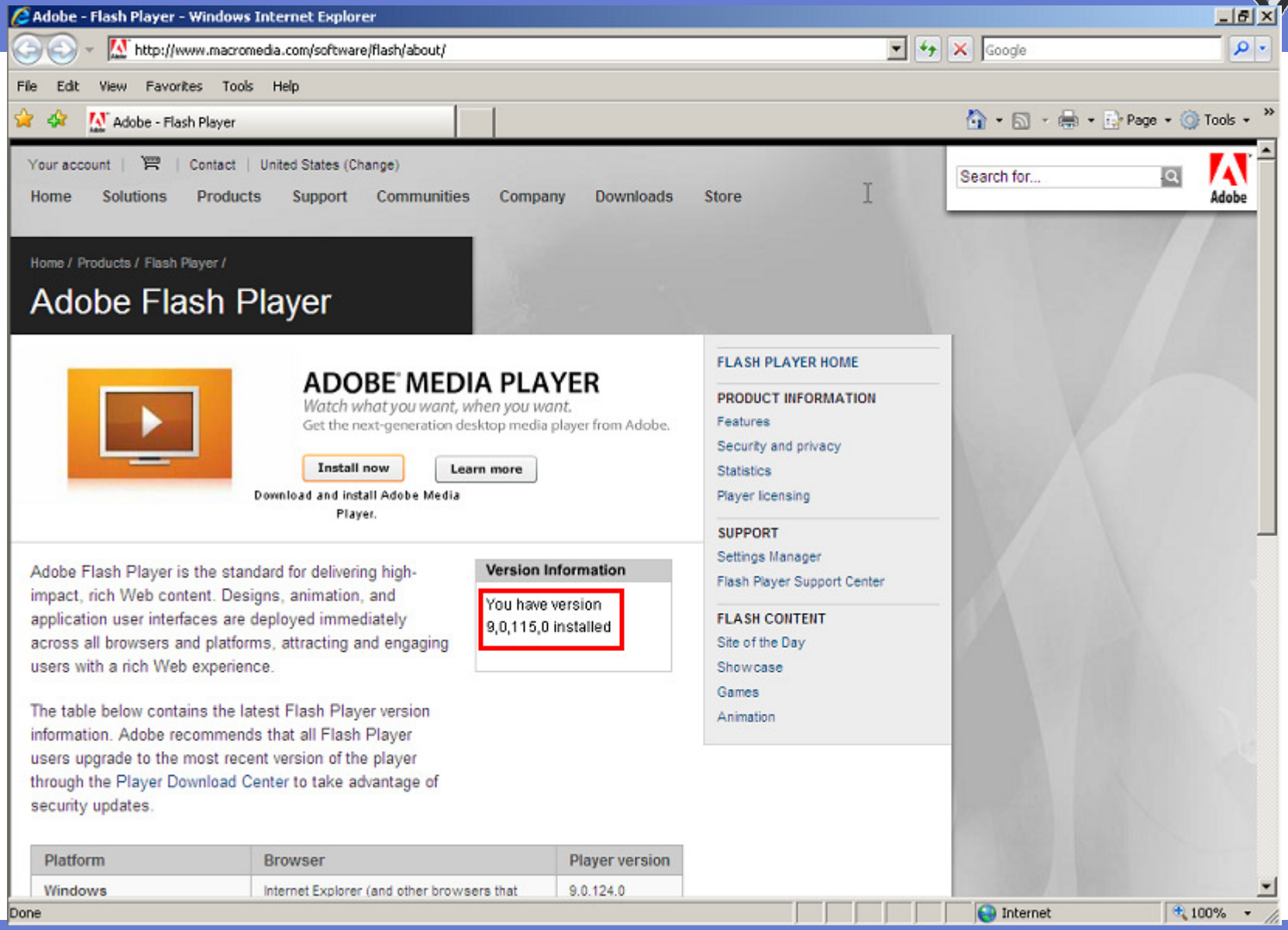

```
2008/06/09 11:58:41 - [UTCD-INFO] Target: http://www.mx5e.com
2008/06/09 11:58:41 - [UTCD-INFO] Priority Level: 4
2008/06/09 11:58:41 - [UTCD-INFO] UMS's URL ID: 4096881
2008/06/09 11:58:41 - [UTCD-INFO] HTTP Request Metadata: null
2008/06/09 11:58:41 - [UTCD-INFO] Remaining Failure Retry: 3
2008/06/09 11:58:42 - [UTCD-INFO] URL Type: Web browser interpretable URL
2008/06/09 11:58:43 - [UTCD-INFO] Content Length: 157,608 bytes
2008/06/09 11:58:43 - [UTCD-INFO] Content-Type: text/html; charset=utf-8
2008/06/09 11:58:43 - [UTCD-INFO] Server Date: Mon, 09 Jun 2008 03:58:20 GMT
2008/06/09 11:58:43 - [UTCD-INFO] Server Type: Microsoft-IIS/6.0
2008/06/09 11:58:43 - [UTCD-INFO] X-Powered By: ASP.NET
2008/06/09 11:58:43 - [GOAT-INFO] WXPSP2-3: Windows XP Pro SP2 + Firefox 2.0.0.14 and IE 7.0
2008/06/09 11:58:43 - [GOAT-INFO] IE6.0/IE7.0 = Enabled, Firefox1.0/2.0 = Enabled
2008/06/09 11:58:43 - [GOAT-INFO] Network IO Check Interval = 5secs
2008/06/09 11:58:43 - [GOAT-INFO] Network IO Activity Tolerance = 512bytes
2008/06/09 11:58:43 - [UTCD-INFO] Sending URL to UAE for automated analysis...
2008/06/09 11:58:43 - [UTCD-INFO] Analyzing website in VMware goat environment...
2008/06/09 12:00:05 - [UTCD-INFO] Time elapsed 1 minutes and 22 seconds
2008/06/09 12:00:06 - [UTCD-INFO] Goat Process ID: 1688
2008/06/09 12:00:06 - [UTCD-INFO] IE 6.0/7.0 Process ID: 776
2008/06/09 12:00:06 - [UTCD-INFO] FireFox 1.0/2.0 Process ID: 1024
2008/06/09 12:00:06 - [UTCD-INFO] Pop-up Window(s) Found: 0
2008/06/09 12:00:07 - [UTCD-INFO] Analyzing tracer log... (1,354,649 bytes)
2008/06/09 12:00:07 - [UTCD-INFO] Time elapsed 0.110128164291 second
2008/06/09 12:00:07 - [UTCD-INFO] Exploited web browser: IE and Firefox
2008/06/09 12:00:07 - [UTCD-INFO] Suspicious folder creation count: 1
2008/06/09 12:00:07 - [UTCD-INFO] Suspicious file creation count: 6
2008/06/09 12:00:07 - [UTCD-INFO] Suspicious registry key creation count: 2
2008/06/09 12:00:07 - [UTCD-INFO] Suspicious process creation count: 2
2008/06/09 12:00:07 - [UTCD-INFO] Threat percentage: 100%
2008/06/09 12:00:07 - [UTCD-INFO] Conclusion: Malicious
```

```
===== DEBUG INFORMATION - GOAT MACHINE CHANGES =====
{'createdir': [
            {'dir': '%windir%\\fonts\\system'}],
 'createfile': [
            {'file': '%temp%\\_bnyunxing0.znb'},
            {'file': '%temp%\\orz.exe'},
            {'file': '%windir%\\system32\\atielf.dat'},
            {'file': '%windir%\\system32\\gsdhadwd.sys'},
            {'file': '%windir%\\system32\\mndhddwd.dll'},
            {'file': '%windir%\\system32\\tpnc.bat'}],
 'createkey': [
           {'key': '%hklm%\\system\\currentcontrolset\\services\\atixeve2781'},
           {'key': '%hklm%\\system\\currentcontrolset\\services\\security'}],
 'newproc': [
          {'776,1375': '%temp\\orz.exe'},
          {'1024,1744': '%temp\\orz.exe'},
          {'1744,576': '%windir%\\system32\\svchost.exe'}]}
===== DEBUG INFORMATION - GOAT MACHINE CHANGES =====
```

Analysis was done in a VMware image with fully patched Windows XP Professional SP2 and latest version of web browsers

This website does not contain any zero-day exploit. So, how did our honey client get exploited?

...continued


Adobe - Flash Player - Windows Internet Explorer
http://www.macromedia.com/software/flash/about/
File Edit View Favorites Tools Help
Adobe - Flash Player
Page Tools
Your account | Contact | United States (Change)
Home Solutions Products Support Communities Company Downloads Store
Search for...
Adobe
Home / Products / Flash Player /
Adobe Flash Player
ADOBE® MEDIA PLAYER
Watch what you want, when you want.
Get the next-generation desktop media player from Adobe.
Install now
Learn more
Download and install Adobe Media Player.
FLASH PLAYER HOME
PRODUCT INFORMATION
Features
Security and privacy
Statistics
Player licensing
SUPPORT
Settings Manager
Flash Player Support Center
FLASH CONTENT
Site of the Day
Showcase
Games
Animation
Adobe Flash Player is the standard for delivering high-impact, rich Web content. Designs, animation, and application user interfaces are deployed immediately across all browsers and platforms, attracting and engaging users with a rich Web experience.
Version Information
You have version 9,0,115,0 installed
The table below contains the latest Flash Player version information. Adobe recommends that all Flash Player users upgrade to the most recent version of the player through the Player Download Center to take advantage of security updates.
Platform
Browser
Player version
Windows
Internet Explorer (and other browsers that
9.0.124.0
Done
Internet
100%

Two-factor authentication in a nutshell









Source:
Images: http://en.wikipedia.org/wiki/Security_token
Article: http://www.finextra.com/fullstory.asp?id=15169

10 April 2006 - 10:41

HSBC to issue Vasco authentication tokens to UK business customers

HSBC is rolling out Vasco's two-factor digital authentication tokens to provide business customers in the UK with secure access to Internet banking services.

The bank will begin issuing the keyring-sized access code devices free of charge to its 180,000 Internet business banking customers in the UK from May. The device generates a single use security code which customers use alongside their user ID and password when making online banking transactions.

The bank says the Vasco device will replace the existing authentication system which is based on digital certificates. As soon as a customer activates the security device, their digital certificates will no longer be required.

HSBC says the device offers "a significant additional line of defence" against online fraud such as phishing, keylogger trojans, remote hacking and screen capturing.

The bank has already issued Vasco devices to customers in Brazil and Hong Kong. Simon Wainwright, head of business banking at HSBC, says: "Our experience in other parts of the world shows that this kind of two factor authentication is an extremely useful weapon in the fight against Internet crime."

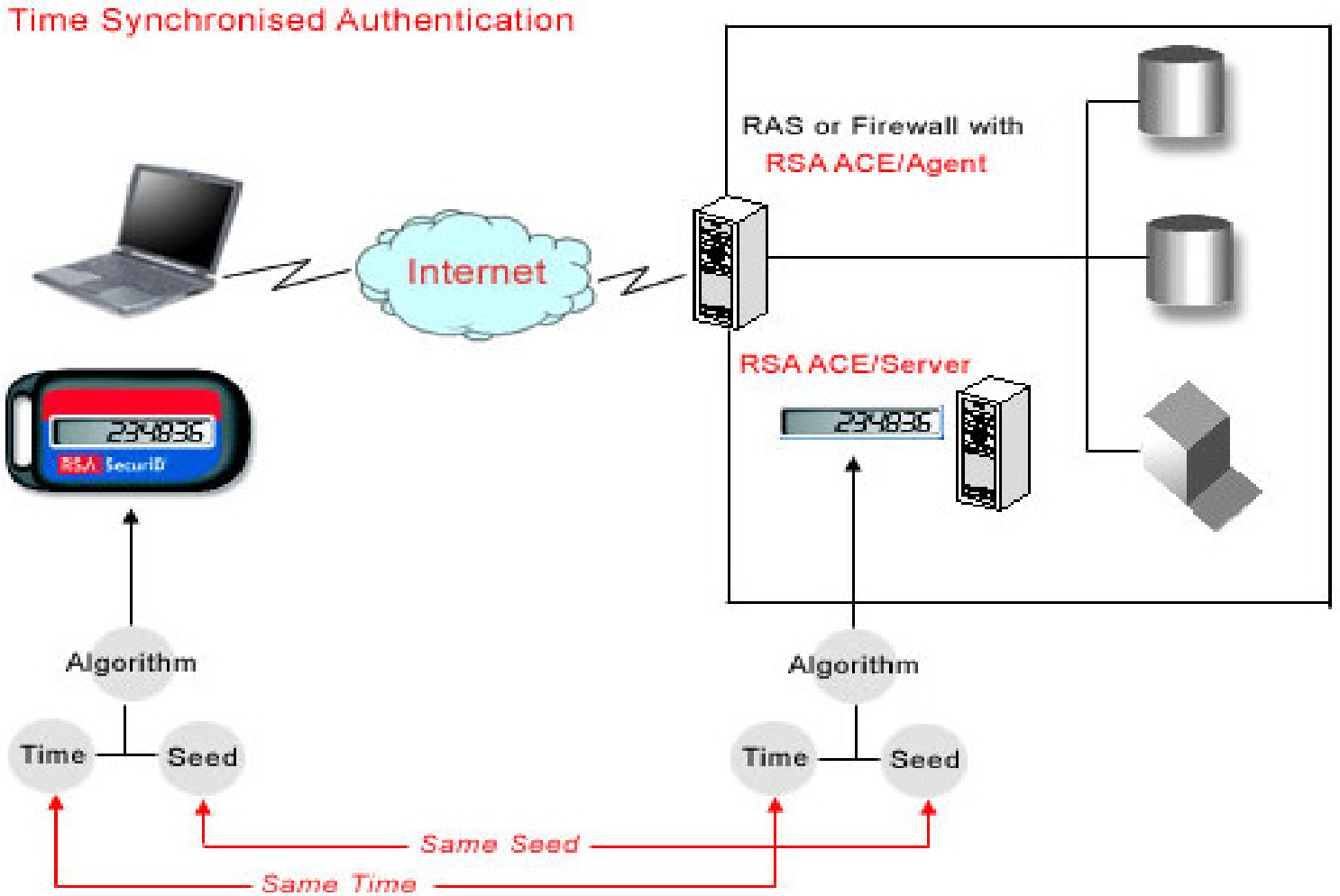
UK bank Alliance & Leicester has launched its own two-factor authentication service, which is based on the PassMark system.

Lloyds TSB has also conducted trials of a Vasco two-factor authentication device. But although the trial was a success the UK bank has no plans for a large-scale roll-out of the technology and is instead waiting for guidance from Apacs on plans for an industry standard card-reading system.

Apacs said in April last year that UK banks were close to agreeing a common industry standard for two-factor authentication of online transactions and banks were expected to begin distributing the authentication devices to customers within the year, but as yet no system has been introduced.

It was thought the standard would be based on a technical specification developed by Visa and MasterCard which would be adapted for domestic use, in the same way that the Chip and PIN standard was adapted.

How does two-factor authentication works?



Source: http://www.mocomsystems.com/Information/RSA.htm

Two-factor authentication ripped by phishers

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Phishing attack evades bank's two-factor authentication

By OUT-LAW.COM
Published Thursday 19th April 2007 09:13 GMT

A two-factor authentication system operated by Dutch bank ABN Amro has been compromised and money stolen from the online accounts of customers who fell for a phishing scam.

Two-factor authentication for online banking usually involves passwords and tokens which provide synchronised, constantly changing numbers to use as additional evidence of identity.

The security industry has promoted the tokens as a preventative measure against hacking for users of remote corporate or banking systems. However, experts have warned that they are still vulnerable to phishing attacks, where fraudulent emails lure recipients to bogus websites that are set up to gather security details.

Four customers who used two-factor authentication have been compensated by ABN Amro for undisclosed amounts taken from their bank accounts.

"We are taking this incident very seriously and, in addition to informing our clients, are also implementing all of the technical measures that are at our disposal to stop criminals in their tracks," said Johan van Hall of ABN Amro Netherlands. "Safe usage of home and office computers is an essential requirement for secure online banking, and we plan to remind our clients even more frequently and urgently than before of that fact."

Hackers sent the customers emails falsely claiming to be from ABN Amro. If recipients opened an attachment, software was installed on their machines without their knowledge. When customers visited their banking site, the software redirected them to a hacker-controlled mock site that requested their security details.

As soon as the hackers received these details they were able to log into a customer's account at the real ABN Amro site, before the expiry of the fob-generated number. They could then transfer the customer's money.

Security experts have warned that such "man in the middle" attacks cannot be prevented by security tokens.

At the E-Crime Congress in London last month, several experts spoke out about the limitations of the systems. "Even when all the banks have it [hackers] will still attack them," said Mikko Hypponen, chief research officer of security firm F-Secure, at the Congress. "We see them using 'man in the middle' already."

Phishers rip into two-factor authentication

By John Leyden
Published Thursday 13th July 2006 15:06 GMT

Phishers are seeking to circumvent two-factor authentication schemes using man-in-the-middle attacks. Last October, US federal regulators urged banks to adopt two-factor authentication as a means to combat the growing problem of online account fraud.

Two-factor authentication involves the use of a password-generating device along with conventional passwords. That means a thief must know more than just a password to gain access to a user's account. Although the technology helps guard against fraud, a recent attack against Citibank shows the technique is far from foolproof.

A bogus security warning ostensibly from Citibank, and targeting customers of its Citibusiness service, urged prospective marks to visit a website and enter not only their account details and password (as with conventional phishing scams) but also the code generated by the customer's token. These authentication key codes change every minute or so.

The fraudulent site is automated so it uses this information to log onto the real Citibusiness login site, allowing fraudsters access to compromised accounts. The site, based in Russia, operated last week but has since been shut down, the *Washington Post* reports (http://blog.washingtonpost.com/securityfix/2006/07/citibank_phish_spoofs_2factor_1.html).

The attack confirms concerns (http://www.schneier.com/crypto-gram-0503.html#2) from security expert Bruce Schneier that two-factor authentication schemes have been oversold as a silver-bullet solution to online identity fraud.

Banks in the Netherlands and Scandinavia have used two-factor authentication for years, and the technology is widely credited with helping to make account fraud more difficult. But the Citibank attack shows the growing sophistication of fraudsters, and undermines any notion that this approach delivers complete protection. ®

Bypassing the 2-factor authentication 1/3

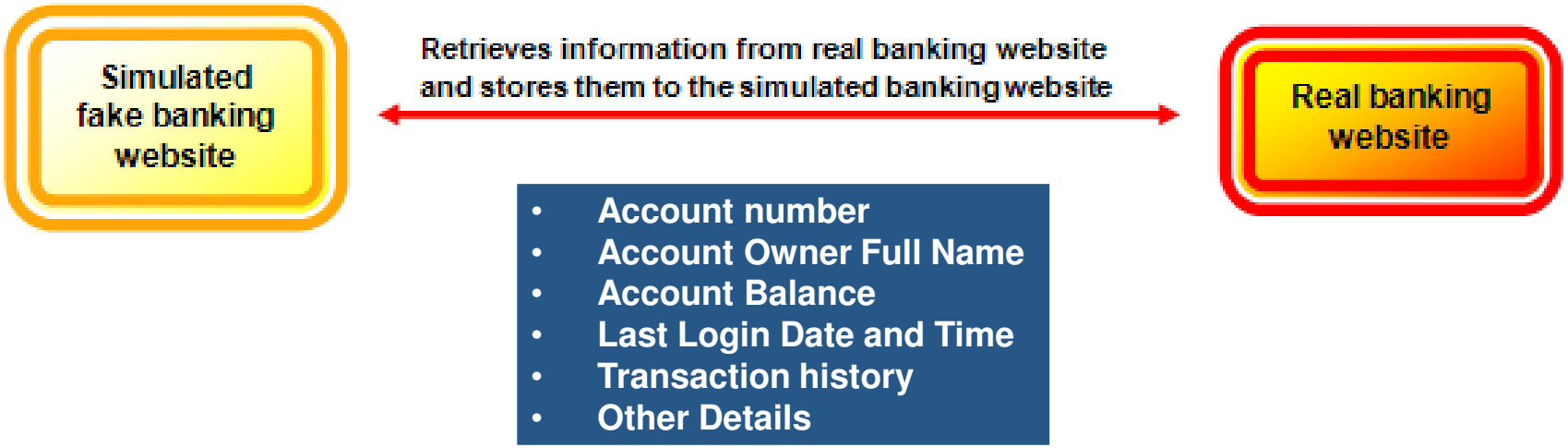
1. Victim logins to the fake banking website using their username, password and one-time-use security token generated from security device provided by bank
2. The attacker uses the login information entered by victim at the fake banking website to login to the real banking website
3. To maintain access of the authenticated session, the attacker writes an automation script to let make his server reload the real website or randomly click on main links at the website

Note:
The technique used in step 3 employs '*local session riding*' at the attacker's server to forge request on behalf of the victim to the real banking site



Bypassing the 2-factor authentication 2/3

1. The attacker retrieves information from the real banking website and stores them to the simulated fake banking website database



Note:
The automation script written by the attacker will keep running at the simulated fake banking website to maintain the authenticated session with the real banking website

Bypassing the 2-factor authentication 3/3

- In online banking systems protected with 2-factor authentication, a security token is required from the user for each transaction to be performed
- Whenever the victim enters a security token to perform transaction, the attacker uses the security token entered at the fake website to perform fund transfer from the victim's banking account to their money mule's account



Note:
The automation script written by the attacker will keep running at the simulated fake banking website to maintain the authenticated session with the real banking website

Transferring all money out from a banking account preset with daily transaction limit



- Since the attacker's automation script is running, the authenticated session can be maintained from a few hours up to a few days depending the design of the web application and frequency of server maintenance or reboot

- If the victim's banking account is preset with daily transaction limit, then the attacker might perform several transactions repeatly in different days to steal all the money

Account Balance	**: $100, 000**
Daily Transfer Limit	**: $ 20, 000**

Day 1 : $0	**(Victim logins to the account)**	**- 1 security token**
Day 1 : - $20, 000	**(Victim pays electricity bill)**	**- 1 security token**
Day 2 : - $20, 000	**(Victim logins to the account)**	**- 1 security token**
Day 2 : - $20, 000	**(Victim performs fund transfer for business)**	**- 1 security token**
Day 2 : - $20, 000	**(Victim pays mobile phone bill)**	**- 1 security token**
Day 3 : - $20, 000	**(Victim login just to check balance)**	**- 1 security token**

Account Balance	**: $ 0**
Daily Transfer Limit	**: $ 20, 000**

The ‘Local Session Riding’ (LSR) attack

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Why such attack is possible?

- More than 90% of the web applications (including online banking sites) were designed in a way that will reset their cookie/session timeout counter whenever there is user activity
- When attackers employ MITM together this method to online banking sites, they are able to maintain the session for a very long time (hours, days, weeks or even months!)
- Logic flaw or convenience feature? You decide ☺

How to reduce the chances of LSR attack?

- Financial related web applications must be designed in a way that users are only allowed to perform transaction in a fixed amount of time in each login. NEVER RESET THE SESSION TIMEOUT VALUE!

Existing phishing identification techniques



- Domain name age checking
- Registrar information from WHOIS
- Hostname resolved IP address (comparison with real site)
- Suspicious IFRAME with tiny width and height
- Suspicious URL or encodings used in URL
- Similar HTML / Javascript source with legitimate website
- SSL certificate validation

Approach used by website blocker / filter



Blacklisting - Identify the bad sites with blacklisted URL database

- Receive phishing reports from public (Eg. PhishTank)
- Automated crawler to find suspicious domain names and websites
- Exchange phishing URLs with security vendor partners
- Block blacklisted URLs with tools installed on client machine

Disadvantages of blacklisting approach

- Unable to identify unreported phishing websites in the wild
- Client side has to keep updated with latest blacklisted URL DB
- Efficiency issue as the amount of blacklisted URL grows

How can we improve it better?



Whitelisting approach

1.Identify the visual similarity of rendered website with legitimate website
2.Check target web server/site characteristics for identification (***WEBSITE FINGERPRINTING!***)
3.Check target URL's domain name age
4.Check target URL's similarity with legitimate URL and suspicious encoding
5.Check target website's content for suspicious characteristics
6.Compare the data obtained from Step 2-5 with the pre-analyzed information of original banking/financial website

Website Finger Printing… Uhmm…

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- Collect information about target web server / site
- Get geolocation of target website from IP address
- Nmap does OS fingerprinting from TCP/IP stack characteristics, we do it from HTTP response characteristics
- Collect information about original web server / site as well
- Get geolocation of the real website from IP address
- Now what? Compare!

When any of the server or website characteristics such server type, server version, server date / time, last modified date, etc. mismatch, it smells…

PHISHY!

Identifying visual similarity of a website

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Simple approach to create signature for web appearance

1. Take screenshot image of a rendered website
2. Calculate the mean values for red, green and blue of the image
3. Use the RGB mean values as '***website appearance signature***'

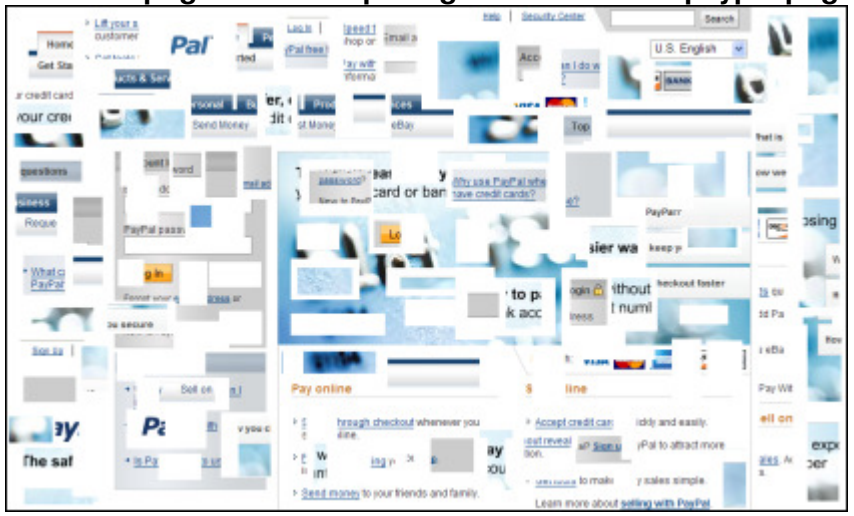
paypal.png - Screenshot of the real PayPal website



[MEAN VALUES]

Red: 226.26349166666665
Green: 232.64016333333333
Blue: 236.67534166666667

messed.png – Messed up image modified from paypal.png



[MEAN VALUES]

Red: 226.26936333333333
Green: 232.64310833333334
Blue: 236.67663166666668

Identifying visual similarity of a website

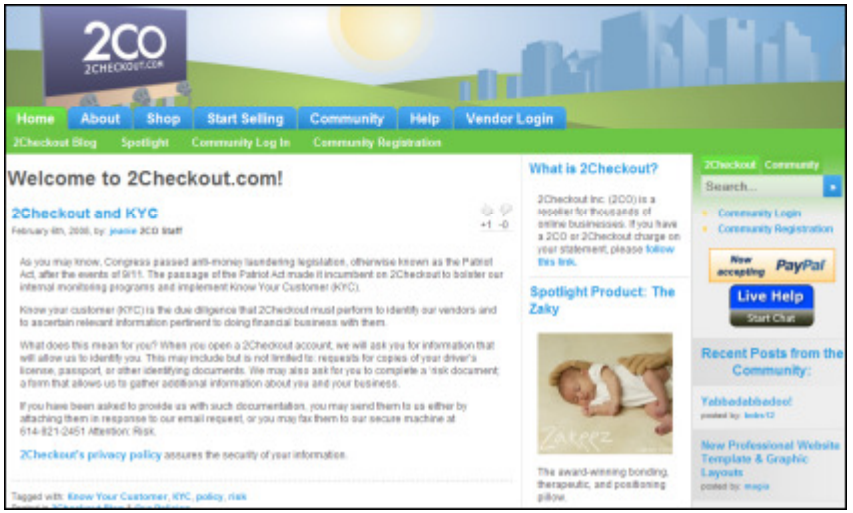
fake.png – Screenshot of fake PayPal website
[with contrast and brightness level purposely tweaked]



[MEAN VALUES]

Red: 225.603835
Green: 231.98625166666667
Blue: 236.01825500000001

2checkout.png – Screenshot of the real 2Checkout.com website



[MEAN VALUES]

Red: 207.40960000000001
Green: 220.19798166666666
Blue: 213.34901500000001

Identifying visual similarity of a website

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r1 – Red color mean value of image-1,
g1 – Green color mean value of image-1,
b1 – Blue color mean value of image-1,

r2 – Red color mean value of image-2
g2 – Green color mean value of image-2
b2 – Blue color mean value of image-2

rDiff = | ((r1 – r2) / 256) |
gDiff = | ((r1 – r2) / 256) |
bDiff = | ((r1 – r2) / 256) |

Therefore,

100 – ((rDiff + gDiff + bDiff) * 100) = % of similarity

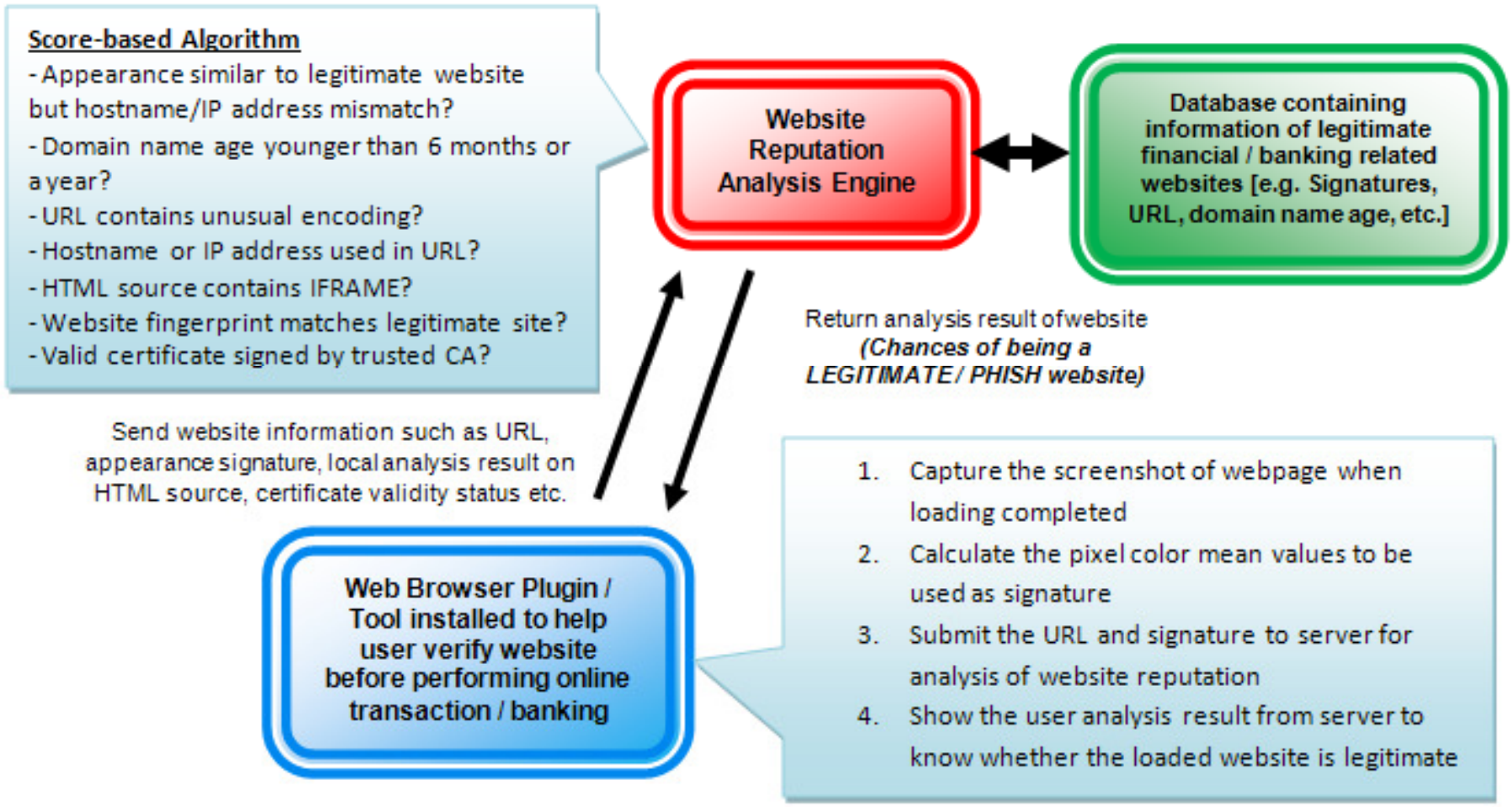
Example calculation:

Difference of paypal.png and messed.png
rDiff = |((226.26349166666665 - 226.26936333333333) / 256)| = 0.00002293619791671875
gDiff = |((232.64016333333333 - 232.64310833333334) / 256)| = 0.000011503906250039 0625
bDiff = |((236.67534166666667 - 236.67663166666668) / 256)| = 0.000005039062500039 0625
100 – (0.00003947916666679 6875 * 100) = **99.9960520833333203125 % similar**

Difference of paypal.png and fake.png
rDiff = |((226.26349166666665 - 225.603835) / 256)| = 0.0025767838541666015625
gDiff = |((232.64016333333333 - 231.98625166666667) / 256)| = 0.002554342447916640625
bDiff = |((236.67534166666667 - 236.01825500000001) / 256)| = 0.002566744791666640625
100 – (0.0076978710937498828125 * 100) = **99.230212890625011718 75 % similar**

Difference of paypal.png and 2checkout.png
rDiff = |((226.26349166666665 - 207.40960000000001) / 256)| = 0.0736480143229165625
gDiff = |((232.64016333333333 - 220.19798166666666) / 256)| = 0.0486022721354166796875
bDiff = |((236.67534166666667 - 213.34901500000001) / 256)| = 0.09111846354166640625
100 – (0.2133687499999998828125 * 100) = **78.663125000000011718 75 % similar**

Example of a basic anti-phishing system



Advantages of ‘web appearance signature’

- Easier to obtain signatures of legitimate sites
- Able to detect unknown or “zero-day” phishing websites

Demo

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