Teaching An Old Dog New Tricks

Q

Detecting BloodHound



February 11, 2019

My original post is no longer available. I have posted it on my personal blog now. It's a couple of years old, but I have been asked about it so here it is:

Regardless of what attack life cycle you follow there are couple items which everyone can agree on:

- 1. Companies have to assume they are already compromised.
- 2. The earlier in the lifecycle that you can catch an attacker the lower the overall cost of remediation will be.

After a host is compromised, the attacker has to create a command and control channel, establish persistence and start to do internal reconnaissance.

SpectorOps continues to raise the bar with the way they (ab)use PowerShell for reconnaissance, lateral movement, and privilege exploitation. Their tools are meant to mimic advanced attackers and help the blue team see how they can improve. Many red teams/pentesters use their tools and at least one hacker, Phineas Fisher, used it when he successfully hacked Hacking Team.

BloodHound

John Lambert's blog post "Defenders think in lists. Attackers think in graphs. As long as this is true, attackers win." explains it well:

"Defenders don't have a list of assets—they have a graph. Assets are connected to each other by security relationships. Attackers breach a network by landing somewhere in the graph using a technique such as

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As defenders, this tool can be used to identify the ways their environments would allow an attacker to get to Domain Admin and possibly eliminate some of the easier paths, but just because the easy path(s) can perhaps be removed doesn't mean that we shouldn't be watching for this type of activity though.

Detection Through Dissection

As we look at various ways to detect Bloodhound and tools like it we need to keep a few things in mind:

• Don't look for signatures/hashes of a file. While this may have some merit, it is too easy to bypass. Just because a vendor does it doesn't mean it's a good choice:

- Client-side detection is going to present a few challenges such as:
 - Right version of PowerShell to get logs
 - WEF setup and configurationVolume of PowerShell related events
 - The ratio of false positives/actual attacks

No matter how much defenders get right, there is the never-ending game of cat and mouse as the attackers continually find ways to bypass enforcement and/or detection. At Derbycon 6, Ben 0XA's talk, "PowerShell Secrets and Tactics," goes into some of these bypasses. Casey Smith (@subtee) regularly posts innovative ways to run PowerShell without running powershell.exe or bypassing AppLocker policies to get PowerShell scripts to run.

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- Windows 2012 R2 server with SQL 2012 and a Windows 10 client. All of them are part of the 'learning.net' domain. To make it a little more realistic, I created 20,000 users and 20,000 groups.
- 2. Look at the source code4, read the Github Wiki5, and watch the presentation6.
- 3. To see the events in near real-time, I set up ArcSight ESM 6.9.1c Patch1 and am using the ArcSight SmartConnector (Windows Native) to monitor the security, application and system logs of the domain controller.

Bloodhound is broken up into two distinct parts: data ingestion (i.e. gathering/pilfering) and data visualization. Data gathering can be done by itself with the output sent to CSV files or sent right into the backend Neo4J graph database.

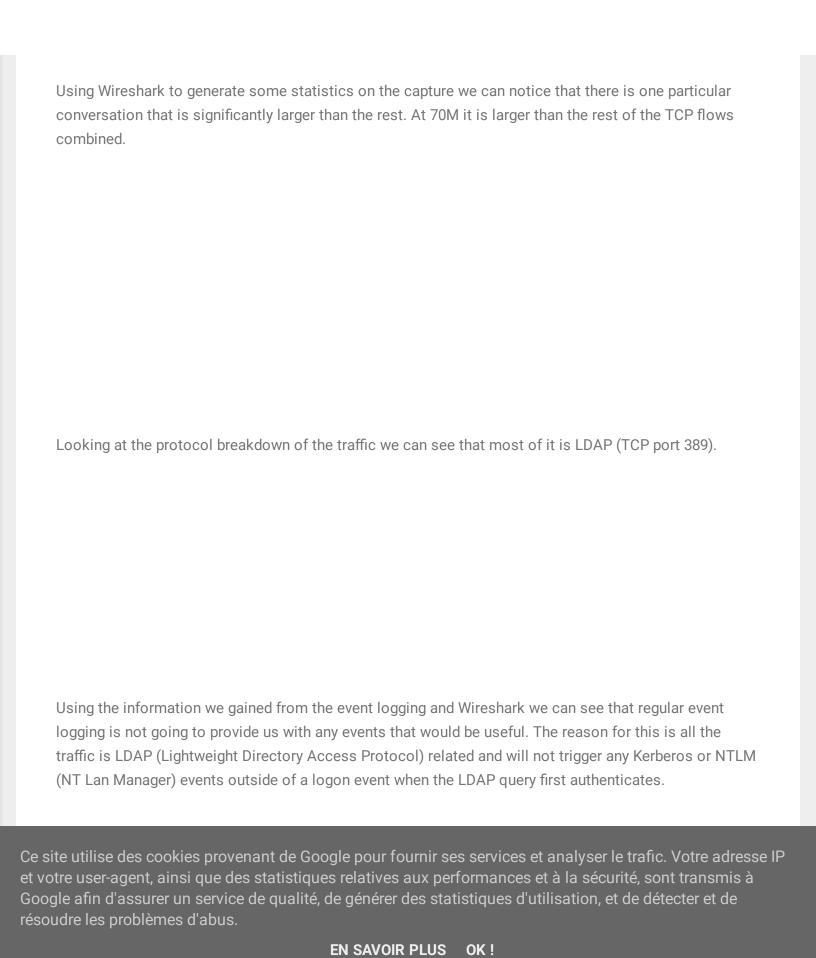
Under the hood BloodHound's reconnaissance is a specialized version of Powerview7. One of the exciting features of Powerview is that it only needs Powershell version 2.0 to work; no additional modules or RSTAT (Remote Server Administration Tools). This means that it can run by default on any Windows 7 or newer OS. It can also be run by a regular user on the network. There are no exclusive rights required to get the information.

While there are eight different collection methods, all of them the enumerate the users and groups. All of this enumeration is done using LDAP (Lightweight Directory Access Protocol) via ADSI (Active Directory Services Interface). From a defensive standpoint, this is a nightmare since there is no logging for this, as we will see during the testing.

To start understanding when we run BloodHound, we are going to enable Windows Event Logging on the Domain Controller. To enable all the categories/subcategories for both success and failure auditing, I run the command "AUDITPOL /SET /CATEGORY:* /SUCCESS:ENABLE /FAILURE:ENABLE." To validate that everything is set properly I run the command "AUDITPOL /GET CATEGORY:*".

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Detecting BloodHound - 31/10/2024 15:44 http://www.stuffithoughtiknew.com/2019/02/detecting-bloodhound.html
Before I run BloodHound, I baseline the events. I have two separate continuous active channels running; one for all Windows events and one for "Target UserName = apu" (the account I am using to test with). The number of events generated before running BloodHound is minimal as seen in the screenshots below.
Before I run BloodHound, I will start Wireshark with no capture filters applied to see what we can learn about its traffic patterns. Since we don't have a lot of hosts in the lab, we will focus on the traffic to the domain controller.
After running BloodHound, we can see the number of logs generated was negligible, especially considering the lab has nothing running. In a production environment, there would be no way to see the minimal increase in events related to BloodHound.
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you should be looking for, run BloodHound in your network while monitoring the traffic with any network capture program and then see how much data was sent (total and each direction) and the time taken for Bloodhound to do its LDAP query(s). Since LDAP is primarily used for searching for information, the queries should be specific to certain item(s), and as a result, they should be quick and transfer minimal amounts of data. The query that BloodHound enumerates all user accounts which is abnormal, especially when it comes from the user segment.

HoneyTokens

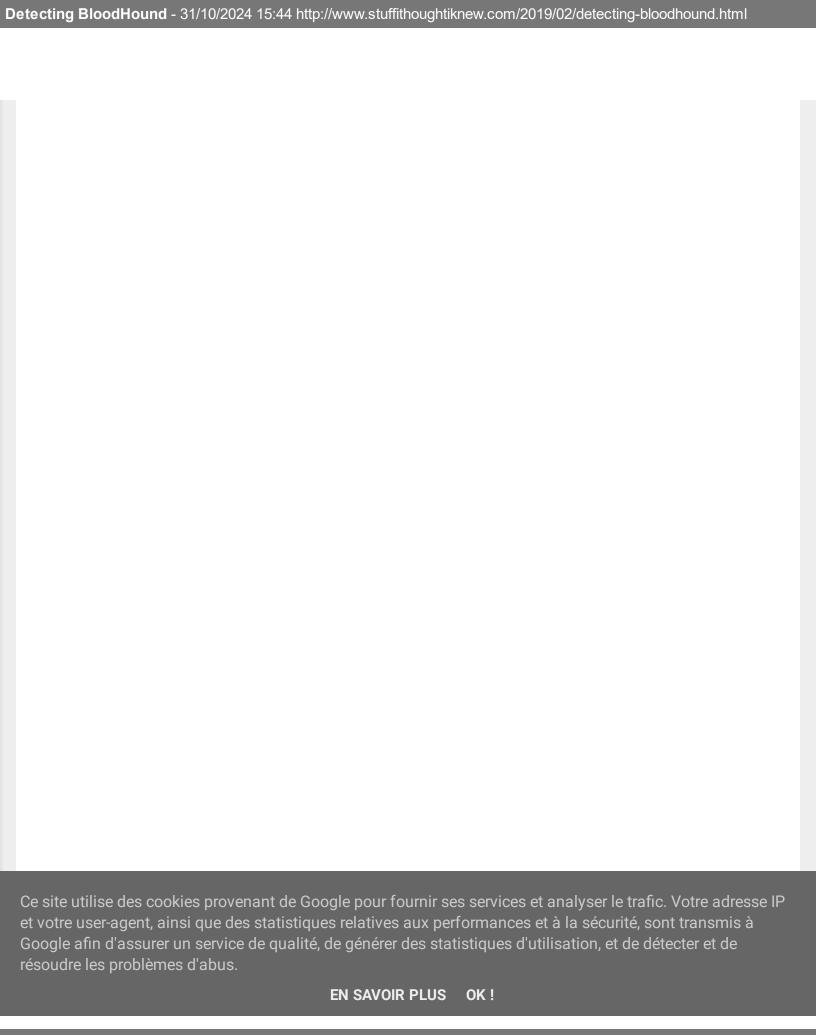
Using honeytokens to detect malicious activity is nothing new. However, the detection is centered around the use of the information, not the enumeration of them. User and groups are directory objects and can be audited just like files/folders giving valuable audit information. To enable this first ensure that the "Directory Service Access" subcategory is enabled under "DS Access."

To accurately detect AD enumeration, the honeytokens need to be set up accordingly:

- User and Group accounts need to be create.
- The naming convention of the user and group accounts need to spread out across the alphabet.
- The more accounts the more accurate the detection.
- Group accounts should contain regular user accounts as well as honeytoken user accounts.

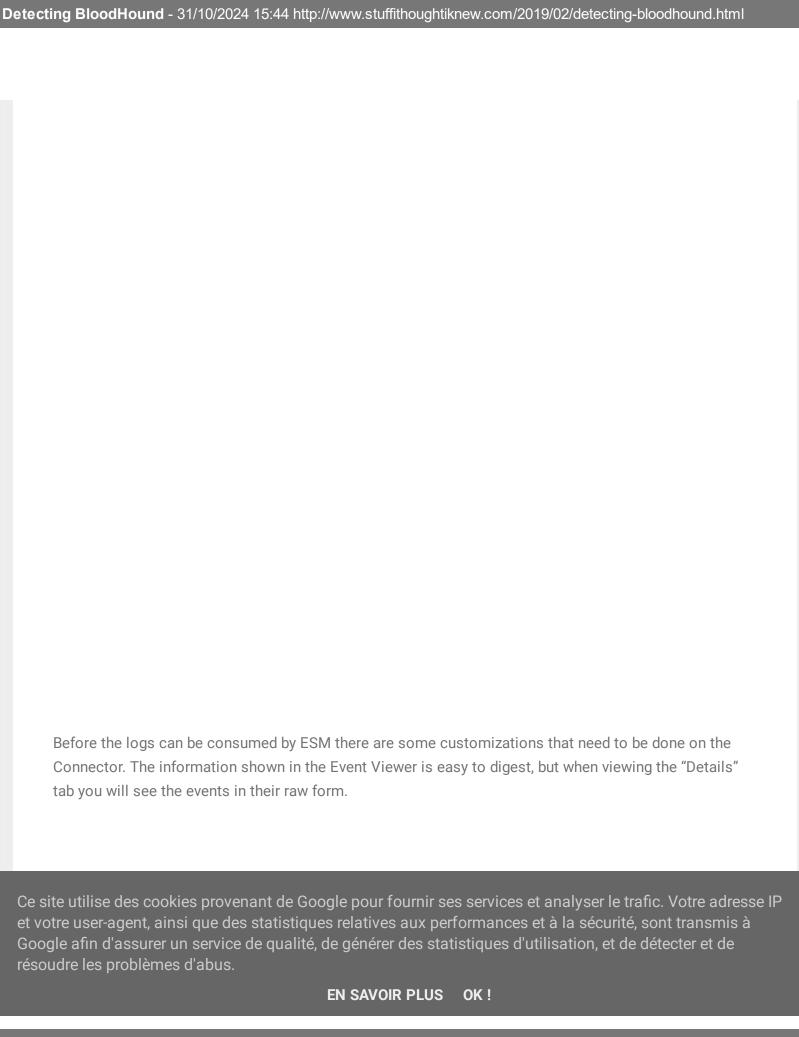
To enable auditing the "Advanced Features" option needs to enabled on the "Active Directory Users and Computers" MMC.

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Detecting BloodHound - 31/10/2024 15:44 http://www.stuffithoughtiknew.com/2019/02/detecting-bloodhound.html
Set the following properties:
Principal = Everyone
Applies to = This object only
Permissions = Read all properties
After enabling all the proper settings event ID 4662's will be logged anytime one of these objects is
enumerated.
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résoudre les problèmes d'abus.
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As you can see the GUIDs for "ObjectType" and "ObjectName" are given. While the SmartConnector can look up GUIDs there can be some issues with this (i.e. unresolved GUID, GUID not found, GUID lookup timeout, etc.) in a busy environment. Since this information is critical for us I added a parser override to normalize the GUID and a two map files: one to map the schema GUID's (user and group) and one to map the user/group specific information. A zip file with the three files is provided at the end of this post. After the auditing is turned on I run BloodHound again to see what information is logged. There were 37 4662 audit events generated.

This gives us the user name of the person who enumerated the objects, not the host/IP/device that they are on. A simple pivot of off the user name will give us possibly compromised hosts. When first implementing this, a one week bake in period should be observed. During this time investigate any accounts that are enumerating AD user/group objects and document them. There will be servers/applications that need to do this type of activity as part of their function, but they should be filtered out after have been vetted.

Conclusion

With BloodHound advancing the state of internal reconnaissance and being nearly invisible we need to understand how it works to see where we can possibly detect it. By moving the detection to the network and AD event logs, we can stay hidden. Attackers can't see the monitoring or even know they are monitored until they have trigged the events. By dissecting the tool, we can better understand the functionality and then monitor for that instead of signatures that are easily defeated.

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sandeep saxena May 3, 2019 at 4:59 AM

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Anonymous *June 3, 2022 at 2:31 AM*

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Hi Every One September 12, 2022 at 10:43 PM

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Cyberz Pc September 12, 2022 at 11:45 PM

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Silent Girl September 14, 2022 at 8:16 AM

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Anonymous December 4, 2022 at 12:46 AM

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Anonymous December 7, 2022 at 12:36 PM

Following a set of tips for slot recreation improvement will ensure the the} success of the slot recreation. This slot machine tutorial has detailed the steps needed for slot recreation improvement. In addition, extra 바카라이트 info like slot recreation features, advantages, and prices have been defined.

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Best Hiking Backpacks April 9, 2024 at 10:07 AM

The Best Hiking Backpack

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