Attack Surface Management Exercises - Educause CPPC 2023

version 1.5 4/27/2023

DNS Enumeration with dnsdumpster.com (5 minutes)

1. Open a web browser and go to https://dnsdumpster.com/.
2. Enter **`cyberspacekittens.com`** in the search bar.
3. Click **Search**
4. Review the results, do you see anything interesting?

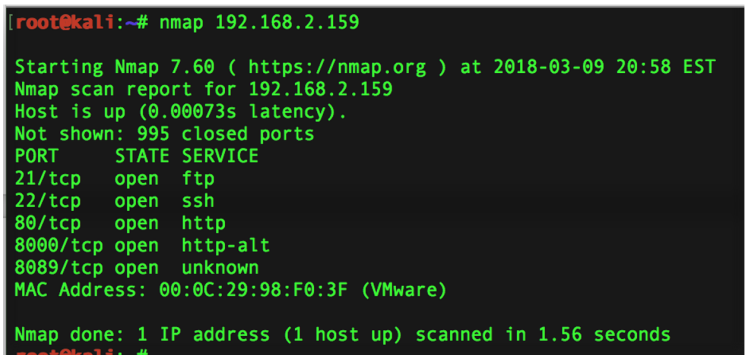
5. Now try the same thing with your organization!

Nmap (15 minutes)

Review the slide for this exercise for an IP address you can use for these exercises. You are also welcome to use an IP address/host/subnet that you have permission to scan.

`target` = replace with the IP address, hostname, subnet, etc that you are attempting to scan

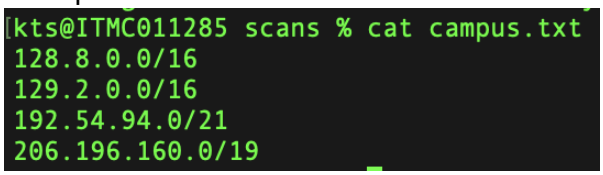
`nmap` ***`target`*** – This will perform a TCP connect (if running as a regular user) or TCP SYN scan (if running as root/privileged) scan with default timeout settings against the top 1000 used TCP ports



Common scan types

`-sT`	full TCP connect scan (default for non-privileged users)
`-sS`	SYN scan (default for privileged users)
`-sU`	SYN scan (default for privileged users)

Target input

DNS	`www.umd.edu`
CIDR blocks	`128.8.0.0/16`
IP Ranges	`10.0.0-255.1-254`
Multiple	`www.umd.edu 129.2.0.0/16`
From a file	`-iL filename` Example: 

Port selection `-p`

`-p22`	Scan port 22/tcp (SSH)
`-p1-65535`	Scan all 65,535 TCP ports
`-p U:53,111,137,T:21-25,80,139,8080`	Scan UDP ports 53, 111, 137 Scan TCP ports 21-15, 80, 139, 8080

Timing `-T`

`-T` *`0-5`* - 0 = super slow, 5 = super fast

OS Fingerprinting `-O`

```
root@kali:~# nmap -O 192.168.2.159

Starting Nmap 7.60 ( https://nmap.org ) at 2018-03-09 20:55 EST
Nmap scan report for 192.168.2.159
Host is up (0.00037s latency).
Not shown: 995 closed ports
PORT     STATE SERVICE
21/tcp   open  ftp
22/tcp   open  ssh
80/tcp   open  http
8000/tcp open  http-alt
8089/tcp open  unknown
MAC Address: 00:0C:29:98:F0:3F (VMware)
Device type: general purpose
Running: Linux 3.X|4.X
OS CPE: cpe:/o:linux:linux_kernel:3 cpe:/o:linux:linux_kernel:4
OS details: Linux 3.2 - 4.8
Network Distance: 1 hop

OS detection performed. Please report any incorrect results at https://nmap.org/
submit/ .
Nmap done: 1 IP address (1 host up) scanned in 3.36 seconds
```

Service Versioning `-sV`

```
root@kali:~# nmap -sV 192.168.2.159

Starting Nmap 7.60 ( https://nmap.org ) at 2018-03-09 21:20 EST
Nmap scan report for 192.168.2.159
Host is up (0.00038s latency).
Not shown: 995 closed ports
PORT     STATE SERVICE  VERSION
21/tcp   open  ftp      vsftpd 3.0.3
22/tcp   open  ssh      OpenSSH 7.2p2 Ubuntu 4ubuntu2.4 (Ubuntu Linux; protocol
2.0)
80/tcp   open  http     Apache httpd 2.4.18 ((Ubuntu))
8000/tcp open  http     Splunkd httpd
8089/tcp open  ssl/http Splunkd httpd (free license; remote login disabled)
MAC Address: 00:0C:29:98:F0:3F (VMware)
Service Info: OSs: Unix, Linux; CPE: cpe:/o:linux:linux_kernel

Service detection performed. Please report any incorrect results at https://nmap
.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 23.98 seconds
```

NSE - Nmap Scripting Engine

Format: **`nmap --script=`*`all,category,dir,script`***

Examples:

`nmap -p 443 --script ssl-enum-ciphers` ***`target`***
`nmap -p 22 --script "ssh*"` ***`target`***
`nmap -p 135-139,445 --script smb-os-discovery` ***`target`***
`nmap -p 80,443 --script "ssl-*,http-*"` ***`target`***

`nmap --script smb-os-discovery` ***`target`***

```
[root@kali:/home/kts# nmap  --script smb-os-discovery 172.16.0.129
Starting Nmap 7.70 ( https://nmap.org ) at 2019-09-10 22:15 EDT
Nmap scan report for 172.16.0.129
Host is up (0.00012s latency).
Not shown: 993 closed ports
PORT     STATE SERVICE
21/tcp   open  ftp
22/tcp   open  ssh
53/tcp   open  domain
80/tcp   open  http
139/tcp  open  netbios-ssn
445/tcp  open  microsoft-ds
3000/tcp open  ppp
MAC Address: 00:0C:29:AB:97:66 (VMware)

Host script results:
| smb-os-discovery:
|   OS: Windows 6.1 (Samba 4.3.11-Ubuntu)
|   Computer name: enpm809q
|   NetBIOS computer name: ENPM809Q\x00
|   Domain name: \x00
|   FQDN: enpm809q
|_  System time: 2019-09-10T22:18:58-04:00

Nmap done: 1 IP address (1 host up) scanned in 0.39 seconds
```

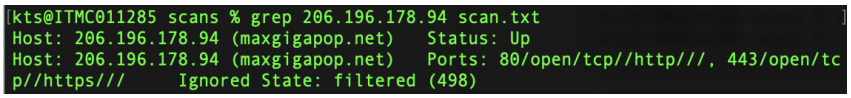
nmap -p443 --script ssl-enum-ciphers *target*

```
[kts@ITMC011285 scans % nmap -p 443 --script ssl-enum-ciphers www.umd.edu
Starting Nmap 7.93 ( https://nmap.org ) at 2023-03-16 13:33 EDT
Nmap scan report for www.umd.edu (18.160.46.99)
Host is up (0.013s latency).
Other addresses for www.umd.edu (not scanned): 18.160.46.81 18.160.46.7 18.160.46.53
rDNS record for 18.160.46.99: server-18-160-46-99.iad55.r.cloudfront.net

PORT    STATE SERVICE
443/tcp open  https
| ssl-enum-ciphers:
|   TLSv1.2:
|     ciphers:
|       TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256 (ecdh_x25519) - A
|       TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384 (ecdh_x25519) - A
|       TLS_ECDHE_RSA_WITH_CHACHA20_POLY1305_SHA256 (ecdh_x25519) - A
|       TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384 (ecdh_x25519) - A
|       TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA256 (ecdh_x25519) - A
|     compressors:
|       NULL
|     cipher preference: server
|   TLSv1.3:
|     ciphers:
|       TLS_AKE_WITH_AES_128_GCM_SHA256 (ecdh_x25519) - A
|       TLS_AKE_WITH_AES_256_GCM_SHA384 (ecdh_x25519) - A
|       TLS_AKE_WITH_CHACHA20_POLY1305_SHA256 (ecdh_x25519) - A
|     cipher preference: server
|_  least strength: A

Nmap done: 1 IP address (1 host up) scanned in 1.93 seconds
```

Output of `nmap` results

`-oN` (Normal output)	
`-oG` (“grepable” output) (not this will not work with NSE script output)	

Manipulating -oG output:

```
grep 445/open results
grep 445/open results | awk '{ print $2}'
```

Shodan (15 minutes)

Feel free to create an account on Shodan, there is a free option that allows you to unlock more searching and more details on results. If you register with a university email account (something ending in .edu) you may get a free upgrade to a full paid account.

1. Open a web browser and navigate to https://shodan.io
2. Start searching for anything you can think of, some examples below (and you can combine multiple search terms into one search
    i. Domain names (umd.edu)
    ii. IP addresses
    iii. Services (ssh, telnet)
    iv. Banners ("OpenSSH", "SSH-1.99")
    v. **`net:XX.XX.XX.XX/YY`**
    vi. **`port:443`**
    vii. **`http.status:200`**
    viii. **`org:Stanford`**
    ix. **`country:US`**
    x. **`title:cyberspacekittens`**
    xi. **`apache city:"College Park"`** (Find Apache servers in College Park)
    xii. **`cisco country:"JP"`** (Find cisco equipment in Japan)
    xiii. **`"default password"`** (Find devices with the default login credentials still set.)
    xiv. **`ssh -port:22`** (Find SSH on non-standard ports)
    xv. **`vuln:CVE-2023-27350`** (Search for a specific vulnerability - Paid/Academic accounts only)

Information on Shodan's search query options:
https://help.shodan.io/the-basics/search-query-fundamentals

truffleHog (5 minutes)

Available from https://github.com/dxa4481/truffleHog

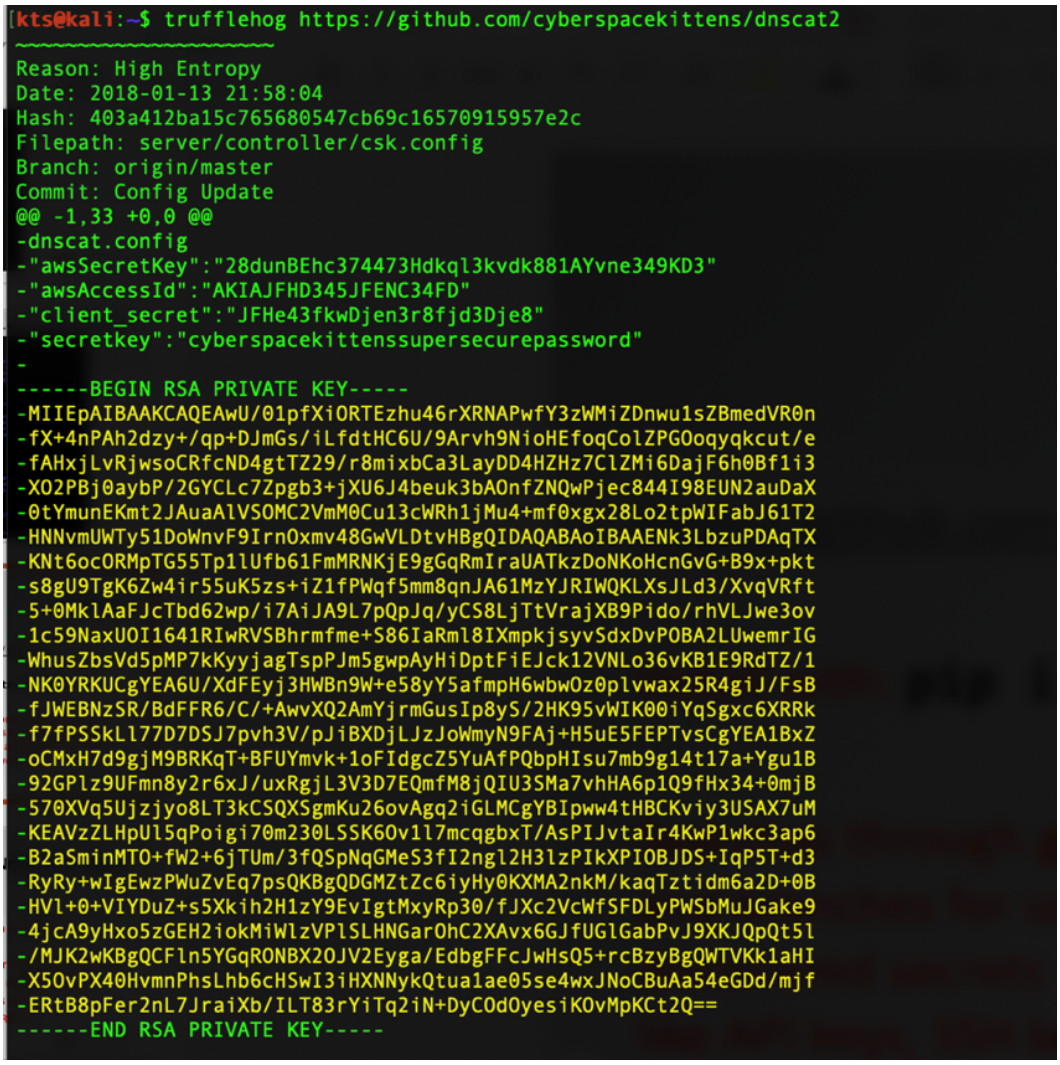
Install with: **pip install truffleHog**

Searches through git repositories, commit histories, and branches for secrets. This is an effective way to discover secrets that were accidentally committed like API keys, SSH keys, passwords, etc.

Example:

```
trufflehog https://github.com/cyberspacekittens/dnscat2
```

Did we find anything interesting?



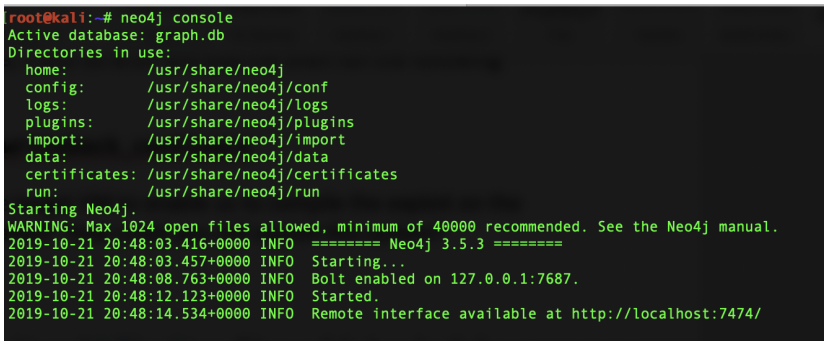
BloodHound Exercise (30 minutes)

BloodHound (https://github.com/BloodHoundAD/BloodHound) is a tool designed to help attackers and defenders graphically map out the relationships in an AD environment, many of which are often hidden and unintended. This can help us as an attacker map out the fastest path between the account access we currently have to getting Domain Administrator. It is also useful to show us who to target.

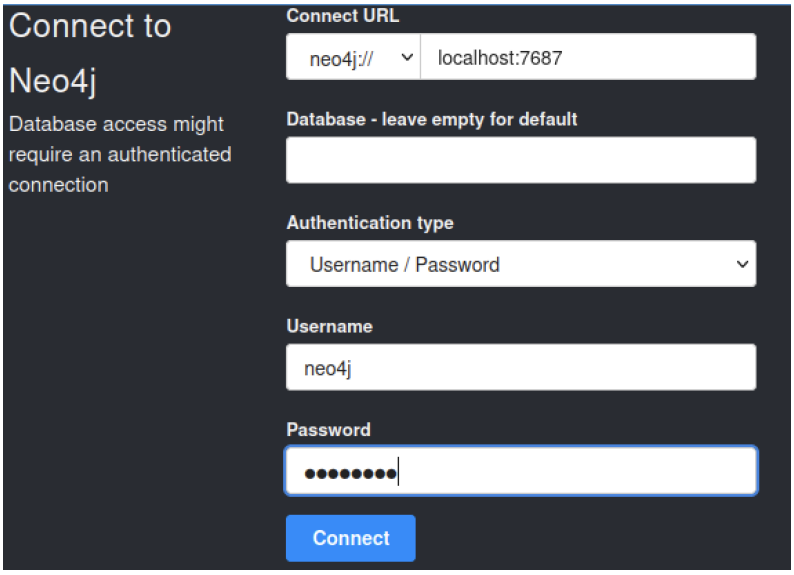
BloodHound works on most operating systems out there but we will use the packages that come for Kali.

1. On your Kali VM open a terminal and run **`sudo apt-get install bloodhound`** which will install BloodHound and all of the packages it needs to run. This may take a few minutes to download and install everything.

2. BloodHound runs on Neo4j, a graph database management system. To run BloodHound we need to start Neo4j with **`sudo neo4j console`** You'll see some information messages and then a notice that neo4j is running at http://localhost:7474/



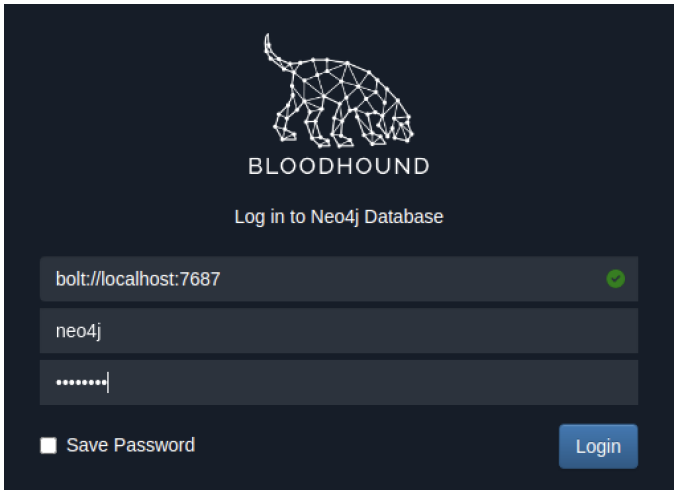
3. In your Kali VM open up a web browser and load **`http://localhost:7474/`** which is the web UI for Neo4j. It will redirect you to the login prompt, the password for the neo4j user is **`neo4j`**.



4. You'll need to select a new password, I'll use **`password`**.

5. Now that Neo4j is running we can start Bloodhound. Inside your Kali VM open a terminal (different from the one you started neo4j in if you started it a Terminal in Kali) and run **`bloodhound`**. You will see a new window pop up for BloodHound, login with the credentials you set in the previous step and then click **Login**.

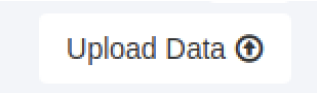
Note: If the window pops up and is just blank/white type **Control+R** to refresh the window and you should see the login page for BloodHound.



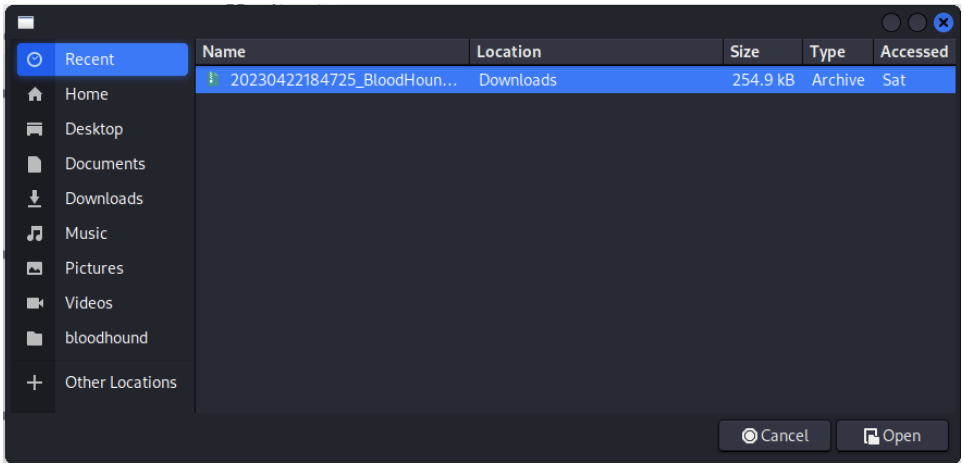
6. Once logged in we have a blank screen. Not very useful. Now we need to load in the results from SharpHound. For this example we will use a sample dataset generated by a tool called BadBlood which is designed to generate a complete Active Directory domain dataset with a number of vulnerabilities inside of it.

7. Download the AD data set from onto your Kali VM by running **`wget https://github.com/kts262/ASM/raw/main/20230422184725_BloodHound.zip`** from a Terminal/SSH session in your Kali VM.

8. Load this data set into BloodHound by selecting the **Upload Data** button on the top right of BloodHound.



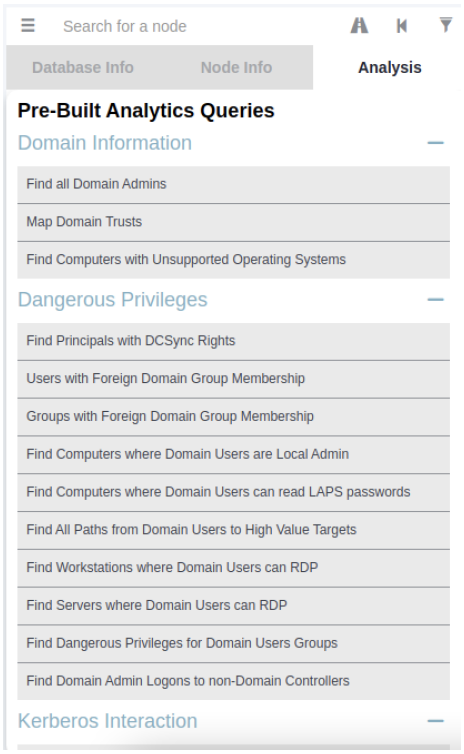
9. Next select the ZIP file from step 7 and click **Open**.



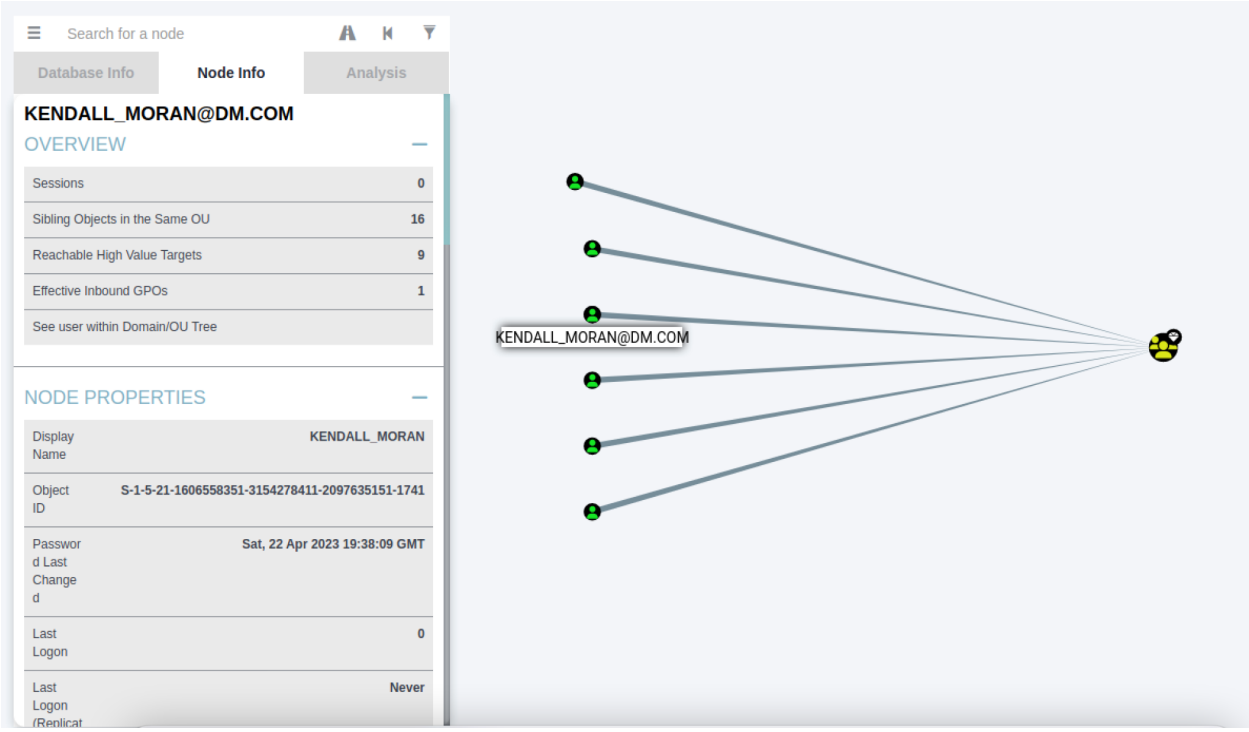
10. You'll see an Upload Progress window that will show the status of the upload/import process. You can exit out of this window when it is finished.

11. Click **Refresh Database Stat**s on the lower left side of the Database Info tab and you should see a large number of Relationships, ACLs, and if you scroll down Users, Groups, Computers, etc.

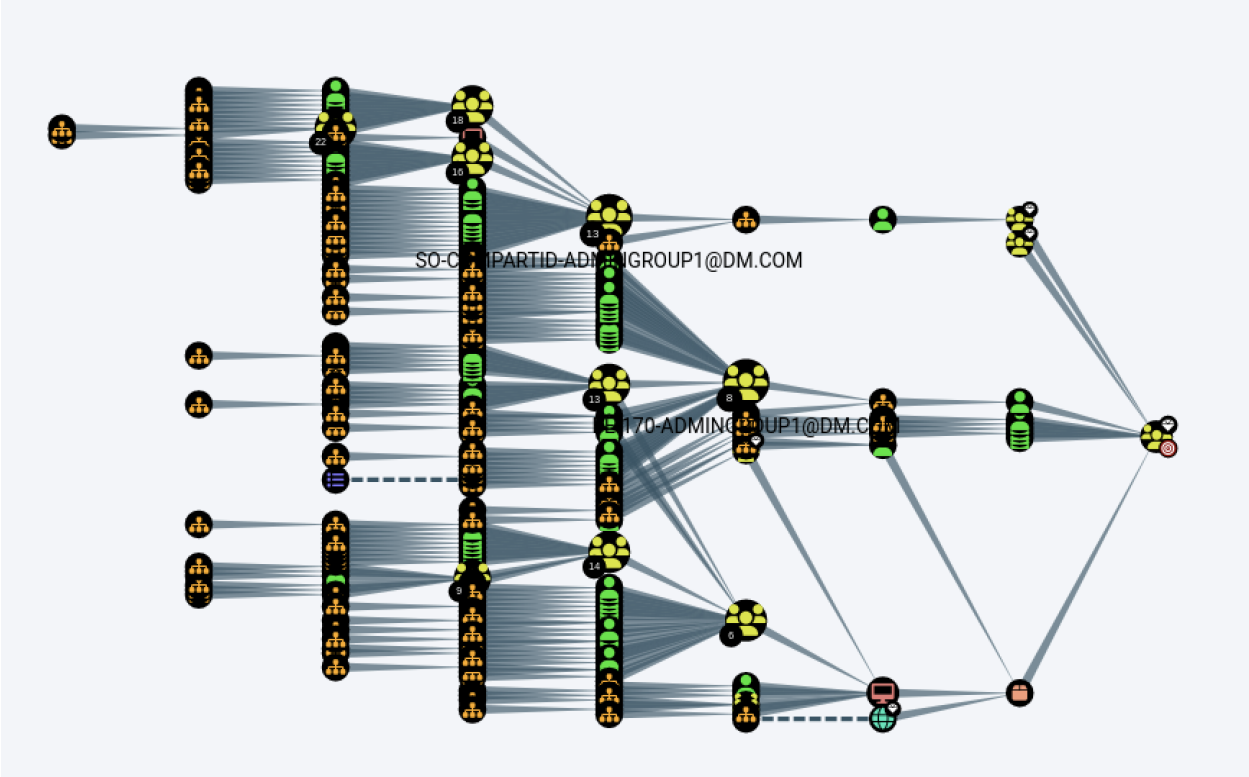
12. Click the **Analysis** tab to see some of the prebuilt queries.



Start with “Find all Domain Admins” and then you can click on one of them to get more information about that specific user account.



13. From here feel free to select some other queries. **Find Shortest Path to Domain Admin** is always an interesting one to show the fastest method to get to Domain Admin.



Note: some of these queries will not return any results, in this case the same data was not configured in a way to show any results for those queries. (In a production environment this is typically a good thing!)