Threat Hunting: Velociraptor for Endpoint Monitoring (Part 2)

hackingarticles.in/threat-hunting-velociraptor-for-endpoint-monitoring-part-2

Raj September 26, 2020

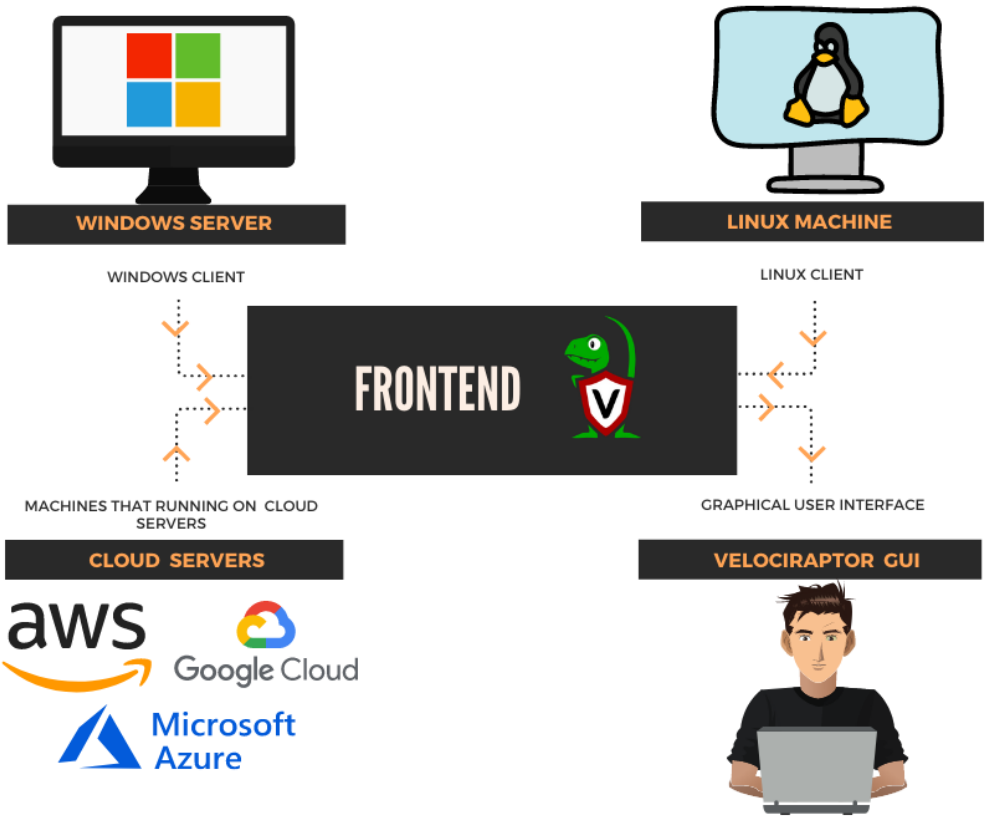
In our previous article, we have covered with Velociraptor master server setup with a brief demonstration of Velociraptor installation, GUI interface set up with some of the forensics Artifacts

If you didn't read that then don't worry you can visit that article from **here**.

Threat Hunting: Velociraptor for Endpoint Monitoring

Once done with a complete server setup we need to focus on "how to Add Hosts or clients of our network environment" for Quick incident Response, forensics, Malware Analysis, and Threat Hunting. In this Blog, we are going to focus our attention only on those machines who shows potential sign of compromises

Now we see how to add a client to the Velociraptor server for further investigations.



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Prerequisites

To configure **Velociraptor Agent** on your client-server, there are some prerequisites required for installation or pen-testing.

- Windows, Linux systems, or cloud servers with admin access.
- Velociraptor Agents
- Attacker: Kali Linux

Agent or Client Environment.

In this article, we will target to install Velociraptor Agents on a Windows server and Linux environments. You can download Velociraptor Agents by following the below link.

`https://github.com/Velocidex/velociraptor/releases`

Choose your installation package

- Go to the official GitHub page of Velociraptor by following the above Link
- Select and install Velociraptor Agents as per your client system

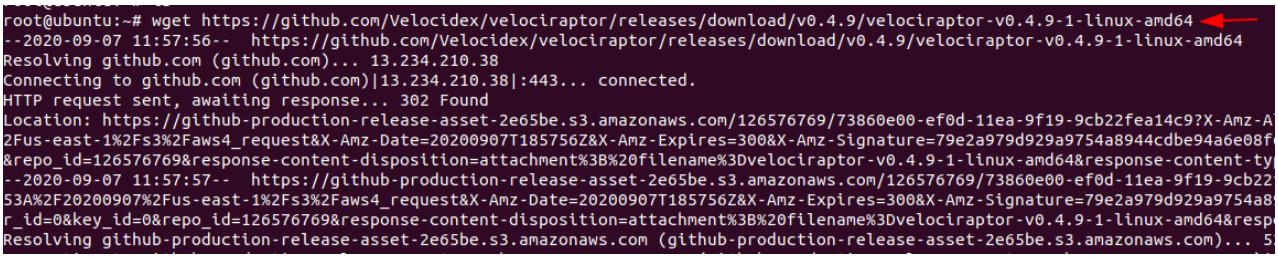
Agent installation

For Linux Systems !!

To install Velociraptor Agent into your Linux systems, follow the steps as described below: Visit to the official GitHub page of Velociraptor locate and select Velociraptor-Linux-amd64 Package

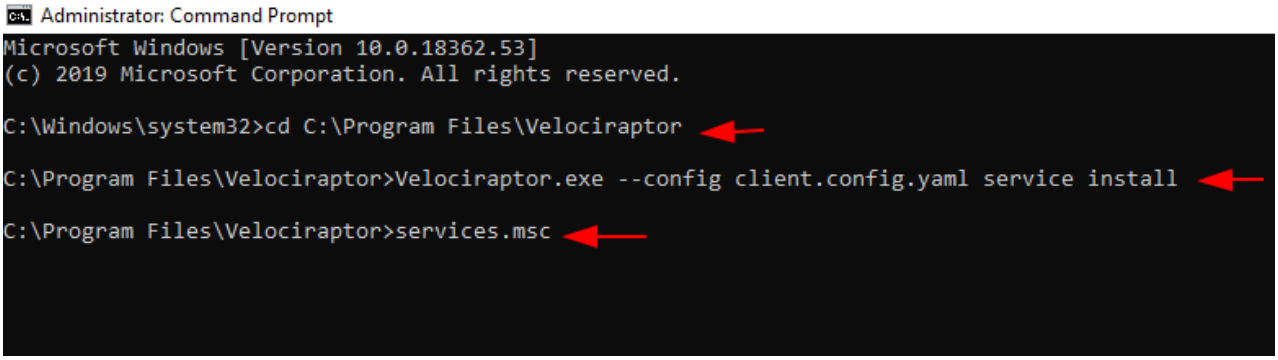
I prefer to download this package via terminal with wget. To download Agent issue the following command into the terminal.

```
wget
https://github.com/Velocidex/velociraptor/releases/download/v0.4.9/velociraptor-
v0.4.9-1-linux-amd64
```

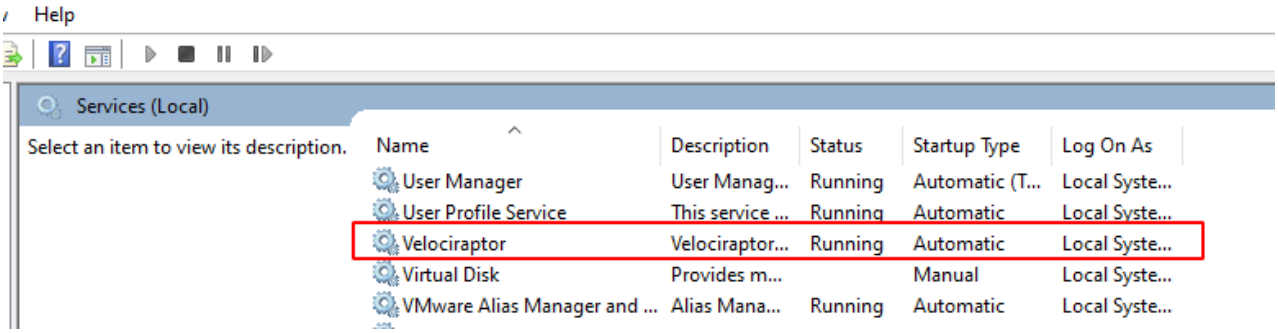


After downloading it, return to your Velociraptor Master Server and issue the following command to install a client service into the server so that it becomes active to accept connections from the client.

```
cd C:\Program Files\Velociraptor
Velociraptor.exe --config server.config.yaml service install
services.msc
```

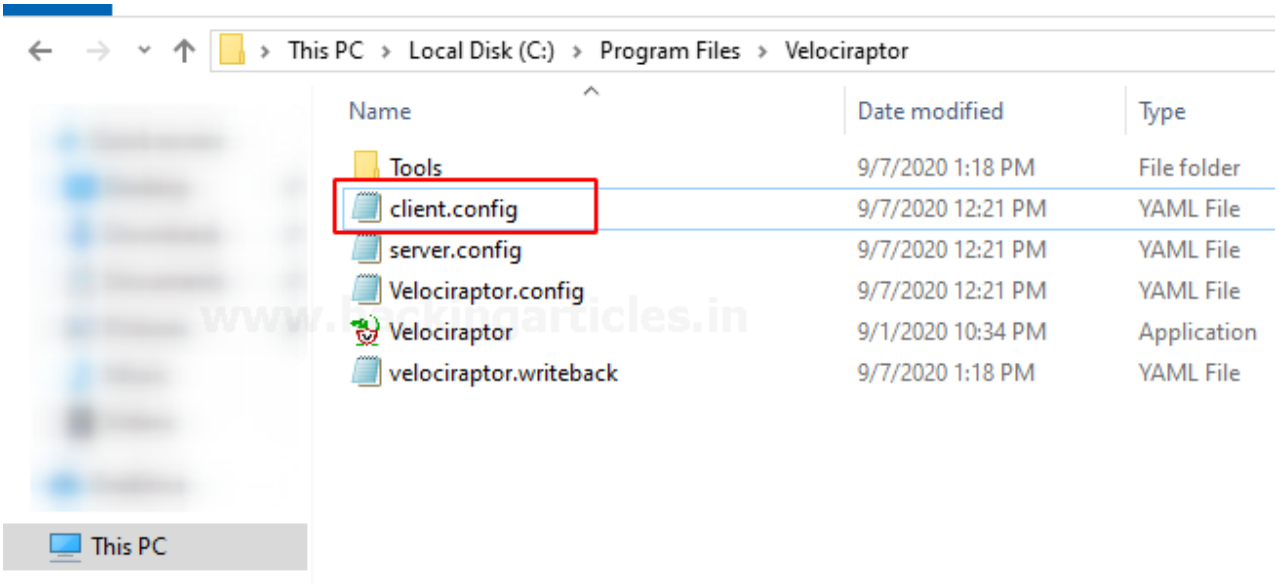


Also, you can verify whether the service is running or not by issuing command **services.msc** it will open a prompt on your screen as shown below:



Nice! As we can see service is enabled or running.

Next, come to the Directory where the Velociraptor server installed and copy the configuration of the client.config



Configure Agent to send data to Velociraptor server

Return to Linux machine and create a client.config.yaml file and paste the configuration of the client.config file which we have copied above inside a **client.config.yaml**.

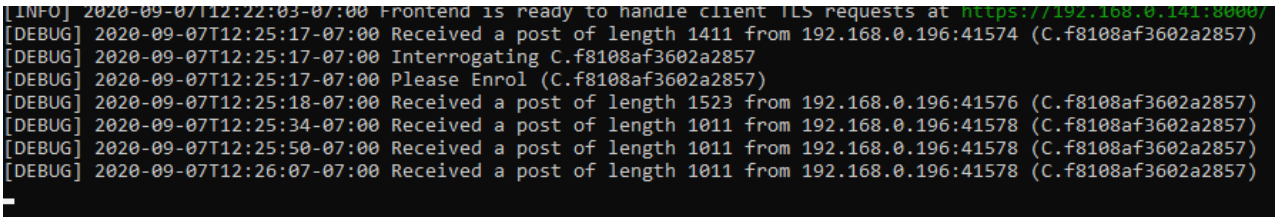
```
root@ubuntu:~# nano client.config.yaml
root@ubuntu:~# cat client.config.yaml
version:
  name: velociraptor
  version: 0.4.9
  commit: 6a559265
  build_time: "2020-09-02T14:19:59+10:00"
Client:
  server_urls:
  - https://192.168.0.172:8000/
  ca_certificate: |
    -----BEGIN CERTIFICATE-----
    MIIDKzCCAhOgAwIBAgIRAP5VZ6SR1vD+Wjt+pnkoOs8wDQYJKoZIhvcNAQELBQAw
    GjEYMBYGA1UEChMPVmVsb2NpcmFwdG9yIENBMB4XDTIwMDkwNzE4NTM0NloXDTMw
    MDkwNTE4NTM0NlowGjEYMBYGA1UEChMPVmVsb2NpcmFwdG9yIENBMIIBIjANBgkq
    hkiG9w0BAQEFAAOCAQ8AMIIBCgKCAQEAzIFoYu8UvsAezWHvA6lmbyxeP1PvpNet
    YXhLIX27NENbxMg4WMVt9yXddWrBS0SYc3qASasC/f9fMxljApmKNr/Q3QA5WwZu
    9JflPw4R1DWOwsu2zpkADPgL1PPi7nw9zehjeP+3DSRoWUSJklBDe4ekL+Czh5wj
    GasigBfeGBN+xys2/QWaXHVH7KXDUy+PELviTj3rjQdQdQ80ni9ywZmQbXlNeGUY
    f9UXeiU4pofrKlC6TfTn7ZvrKoAanzSI/18SLFfOB2PqDeI0q5QL9MRUumJ8JoDF
    G412fpLrMkbSlMDWM9ti8z8ydASqxXIKf59trX7+E98EOITH2CiSCwIDAQABo2ww
    ajAOBgNVHQ8BAf8EBAMCAqQwHQYDVR0lBBYwFAYIKwYBBQUHAwEGCCsGAQUFBwMC
    MA8GA1UdEwEB/wQFMAMBAf8wKAYDVR0RBCEwH4IdVmVsb2NpcmFwdG9yX2NhLnZl
    bG9jaWRleC5jb20wDQYJKoZIhvcNAQELBQADggEBAANyuwbuxCg2LgCRWqnVQo93
    Ke3xPAEzU3xoj/14FGmBB24d2VIbKv8BmjS597655UldwpOhzNxuiiFLbWBJMKL1
    j4HLIPvYTLGW0ogY9xtsuZrNaK4ggB0yyDPDCr7HmbdFYQ5FBoHKcQ+S3ai4SIov
    eJeUccUk/9BbpO4gapLfVwJ6WVuXZA74/G43nNO6CnL2U2nd8ShE23Au0HQLa8KH
    Kh8qa4ooekSMBOY6AUyOZ0fal/EedHPS8LZvmczHgBkSy6OG0NnmD1o1xXhxnDlU
    fvZCVkoXFMdtELU6TojBRK7fky6h30bSl5armQ5PH2xV9NdSi9b6hodT1/rRDvU=
    -----END CERTIFICATE-----
```

This client configuration file contains a CA certificate that is used for authentication between the client's machine to the Velociraptor Master server. After that change permission of the Downloaded Velociraptor Agent to make it executable and then deploy the client to Velociraptor by executing the following command:

```
chmod +x velociraptor -v0.4.9-1-Linux-amd64
./velociraptor-v0.4.9-1-Linux-amd64 –config client.config.yaml client -v
```

```
root@ubuntu:~# chmod +x velociraptor-v0.4.9-1-linux-amd64
root@ubuntu:~# ./velociraptor-v0.4.9-1-linux-amd64 --config client.config.yaml client -v
[INFO] 2020-09-07T12:09:39-07:00
[INFO] 2020-09-07T12:09:39-07:00 | |  / /__  / /___ _____(_)_____ _____ / /_____ _____
[INFO] 2020-09-07T12:09:39-07:00 | | / / _ \/ / __ \/ ___/ / ___/ __ `/ __ \/ __/ __ \/ ___/
[INFO] 2020-09-07T12:09:39-07:00 | |/ /  __/ / /_/ / /__/ / /  / /_/ / /_/ / /_/ /_/ / /
[INFO] 2020-09-07T12:09:39-07:00 |___/\___/_/\____/\___/_/_/   \__,_/ .___/\__/\____/_/
[INFO] 2020-09-07T12:09:39-07:00                                   /_/
[INFO] 2020-09-07T12:09:39-07:00 Digging deeper!                    https://www.velocidex.com
[INFO] 2020-09-07T12:09:39-07:00 This is Velociraptor 0.4.9 built on 2020-09-05T00:08:32+10:00
[INFO] 2020-09-07T12:09:39-07:00 Loading config from file client.config.yaml
Genering new private key....
[INFO] 2020-09-07T12:09:39-07:00 Starting Crypto for client C.f8108af3602a2857
[INFO] 2020-09-07T12:09:39-07:00 Expecting self signed certificate for server.
[INFO] 2020-09-07T12:09:39-07:00 Ring Buffer: Creation {"filename":"/var/tmp/Velociraptor_Buffer
[INFO] 2020-09-07T12:09:39-07:00 Starting Journal service.
[INFO] 2020-09-07T12:09:39-07:00 Starting the notification service.
[INFO] 2020-09-07T12:09:39-07:00 Installing Dummy inventory_service. Will download tools to temp
[INFO] 2020-09-07T12:09:39-07:00 Starting HTTPCommunicator: HTTP Connector to [https://192.168.0
[INFO] 2020-09-07T12:09:39-07:00 Loaded 185 built in artifacts in 63.430937ms
[INFO] 2020-09-07T12:09:39-07:00 Starting event query service.
[INFO] 2020-09-07T12:09:39-07:00 Compiled all artifacts.
```

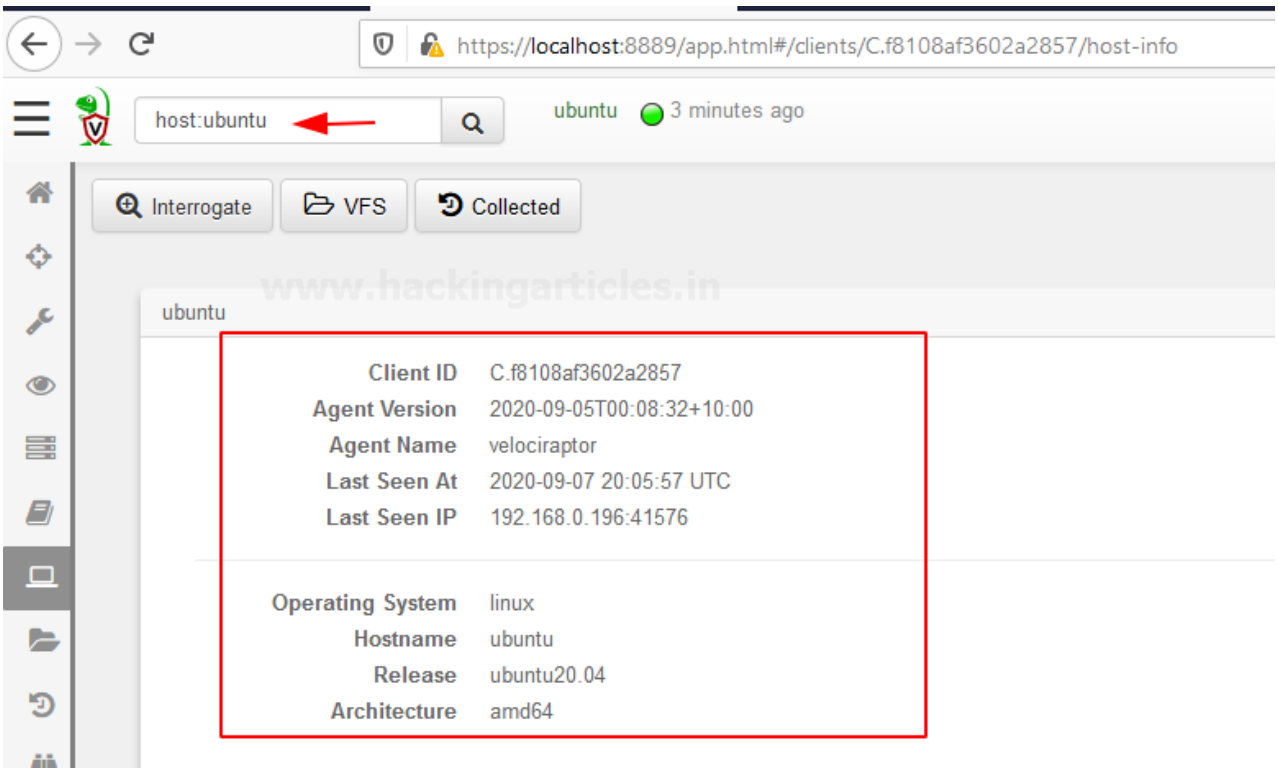
Hmm:) !! As you can see service is started sending logs to the Velociraptor server. You can ensure the integration of the client (Ubuntu) machine with the server inside the Velociraptor Master Server which will generate logs for the client connectivity as shown in the image.



Let's navigate to **http://localhost:8889** to access the GUI interface and verify whether the client is reflected on the interface or not by simply running a query in the search bar

```
host:ubuntu
```

where Ubuntu is my client's system name



Ok !! you have successfully added the Linux system as a client

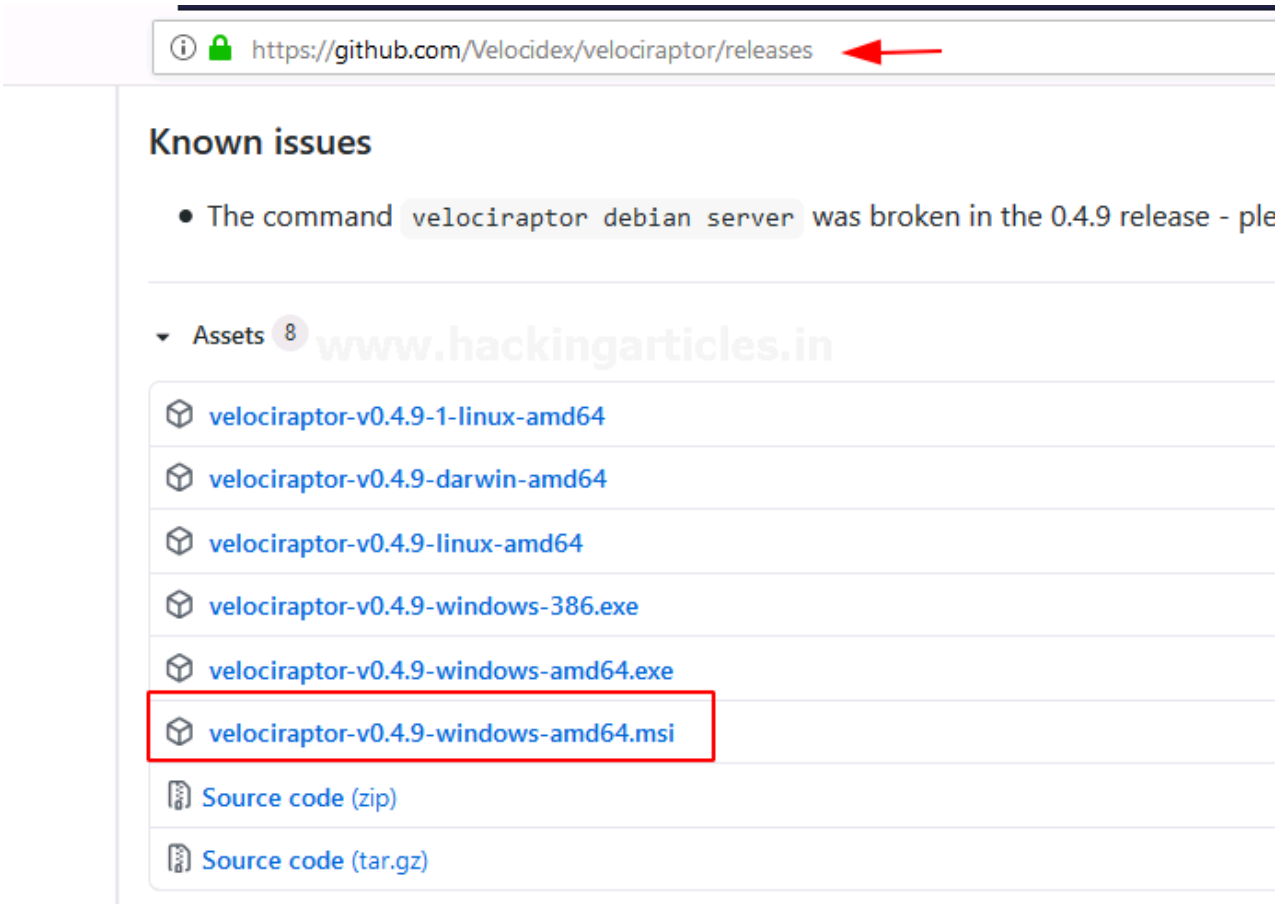
For Windows Systems !!

As described above you can download Velociraptor Agent for your windows system by official GitHub page of a velociraptor

In my case, I will target to install Velociraptor agent in Windows server 2016.

Let's begin the installation !!

Download package **velociraptor-v0.4.9-windows-amd6464.msi**, It will download a ZIP file into Your downloads open it install into the system.

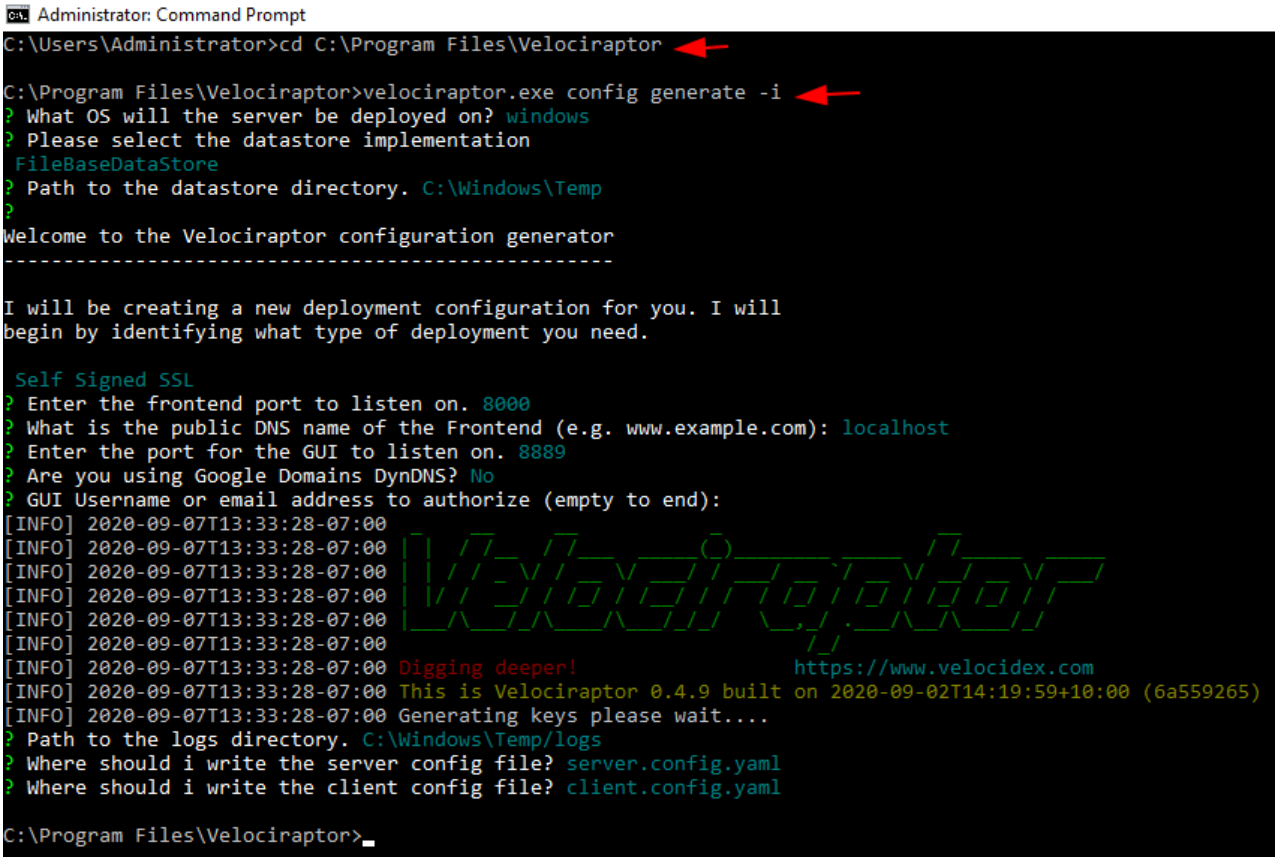


Configure Agent to send data to Velociraptor server Open the command prompt with administrator privilege and navigate to velociraptor folder.

```
cd C:\Program Files\Velociraptor
```

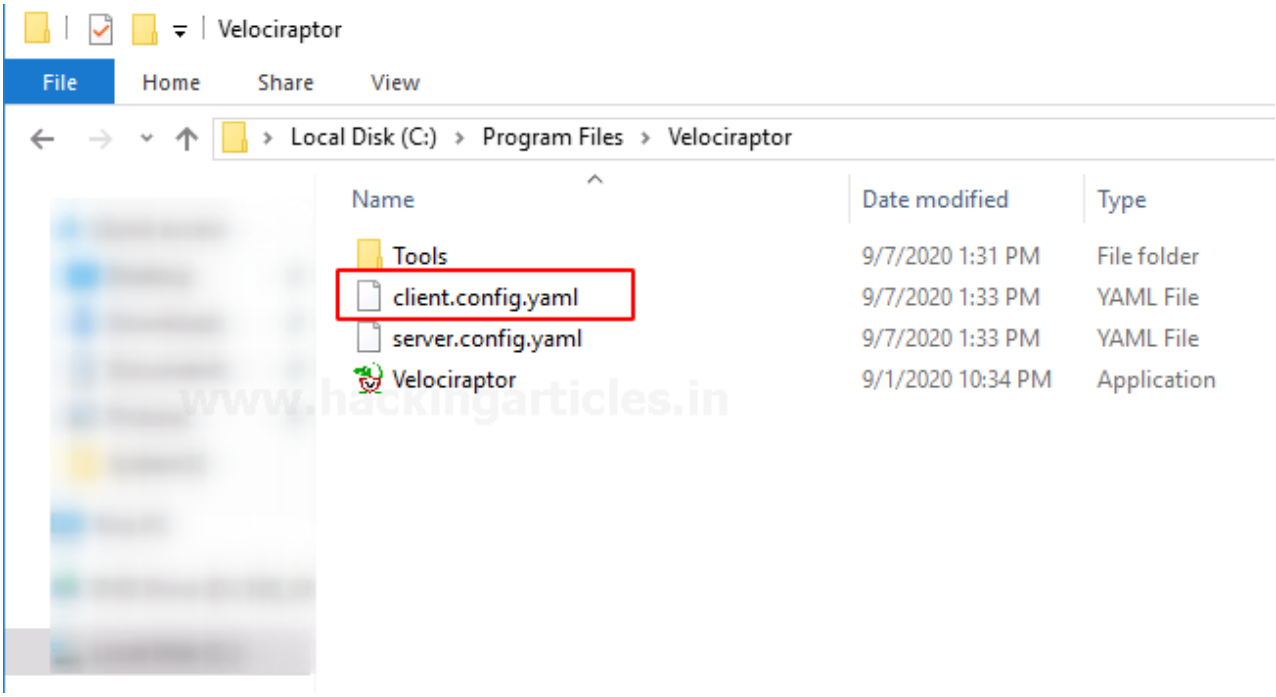
So now what we need to do is to generate the configuration. To generate the configuration execute the following command.

```
velociraptor.exe config generate -i
```

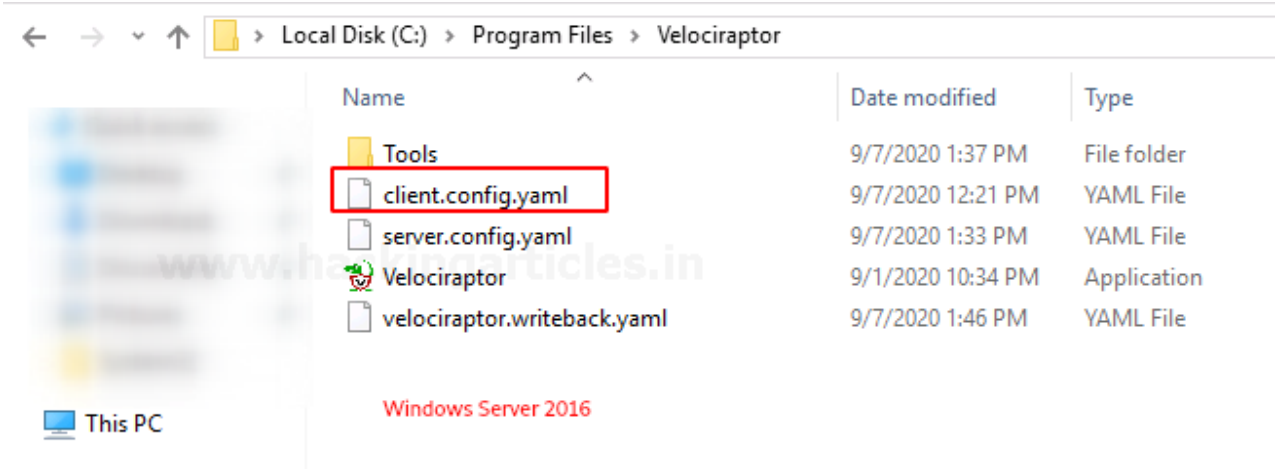


Hmm great !! as we can see the agent is installed successfully. Now, since we have this part done

Return to the Velociraptor master server and go to the directory where it is installed and what we need to do is to copy the client.config.yaml file.

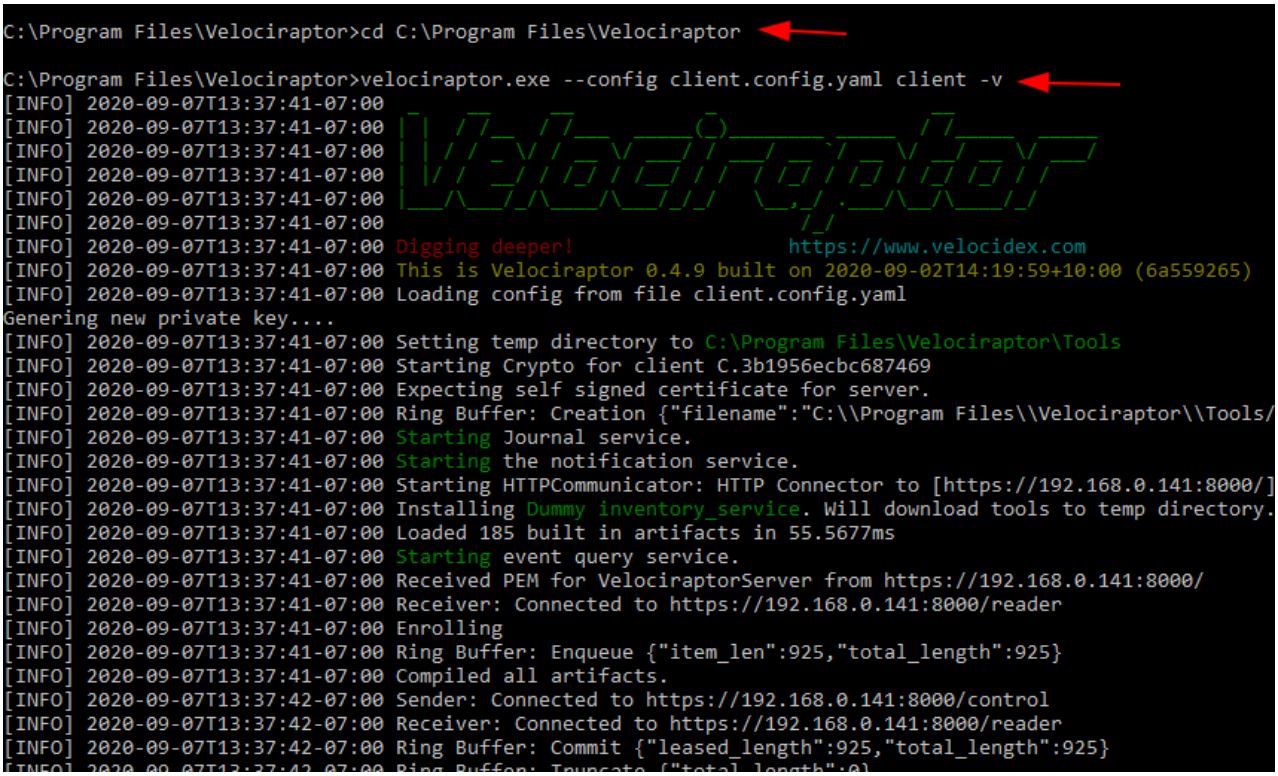


Then come back to the windows machine open the directory where Agent is installed and replace the client.config,yaml by simply pasting the file into that directory



Come back to CMD prompt and deploy your client to the Velociraptor server by issuing the following command

```
Velociraptor.exe --config client.config.yaml client -v
```

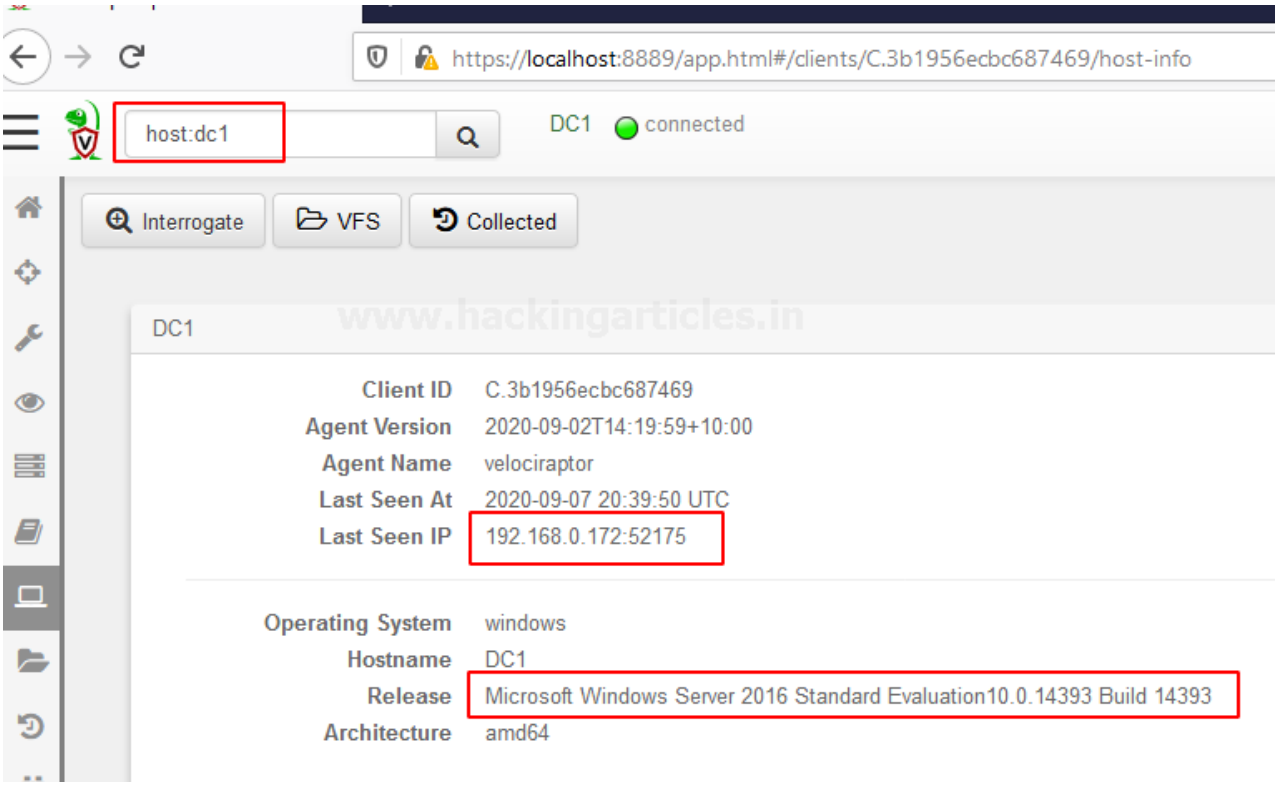


Nice !! You can ensure the integration of the client (Windows) machine with the server inside the Velociraptor Master Server which will generate logs for the client connectivity as shown in the image.

Come back to the Velociraptor server and verify, whether the client is reflected on the GUI interface or not by simply running a query in the search box

```
host:dc1
```

where dc:1 is my client's system name Hmm !! you have successfully added the Windows system as a client. Now, We have successfully added both Machines that will be monitored by Velociraptor server.



Forensic Investigation / Threat Hunting

Let's begin some forensics investigation or Threat Hunting

Now if you go back to the homepage you could be able to see your host by searching in the filter box

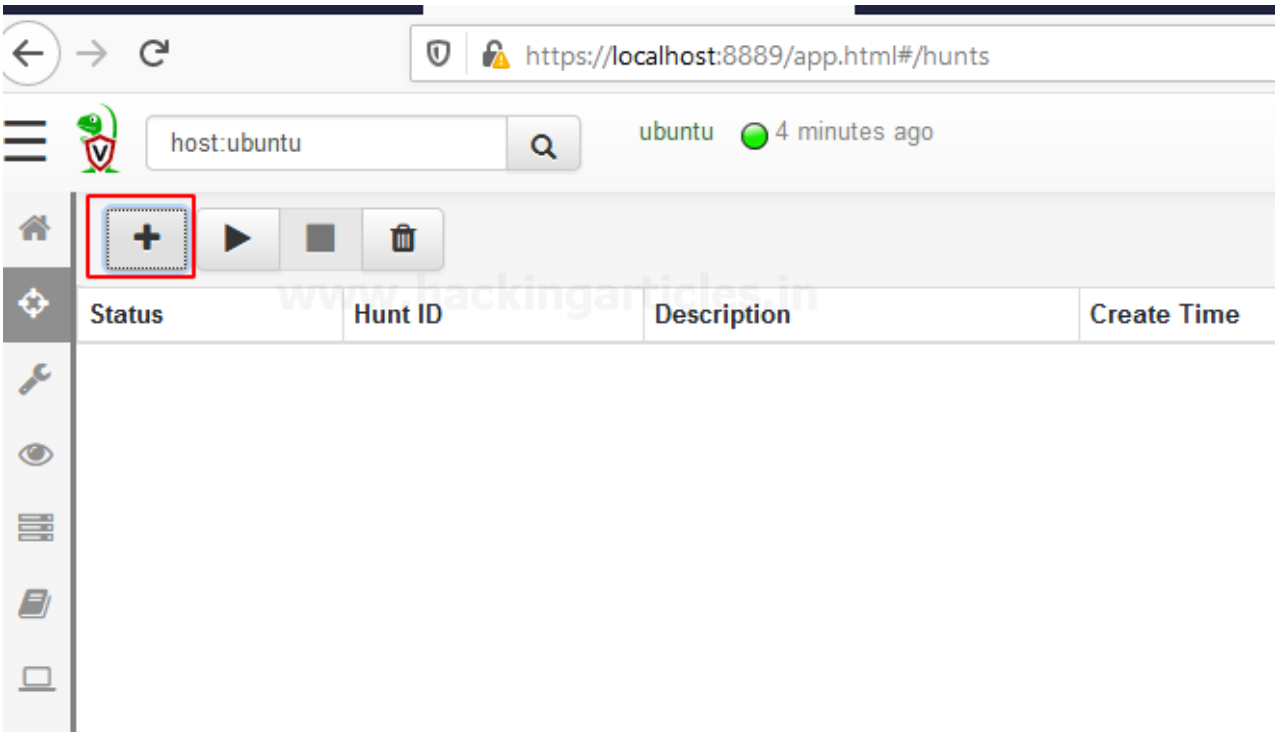
As we have 2 clients connected to velociraptor

Let's start an investigation with Machine-1 (Ubuntu) !!

So now we have Hunt Manager you can easily find it on your Dashboard

Hunt manager allows you to hunt for the specific events that happened to your client and also you can view specific artifacts and server events.

we need to create a hunt with specific artifacts to do this move your cursor to the **"+"** button and select it as shown below.

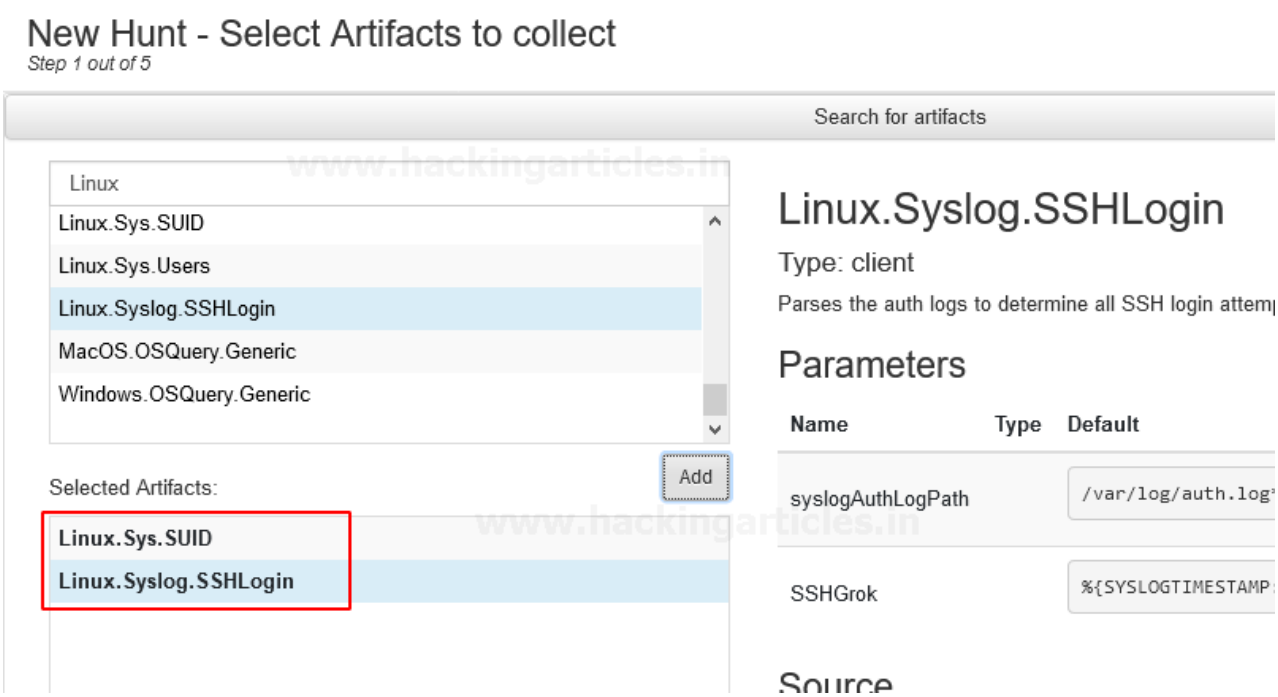


To create a new hunt in the search window start typing Linux then select the artifacts that you want to hunt and add then select **"Next"**,

Some prebuilt Artifacts can be used for forensics of Linux systems Available on Velociraptor as listed below

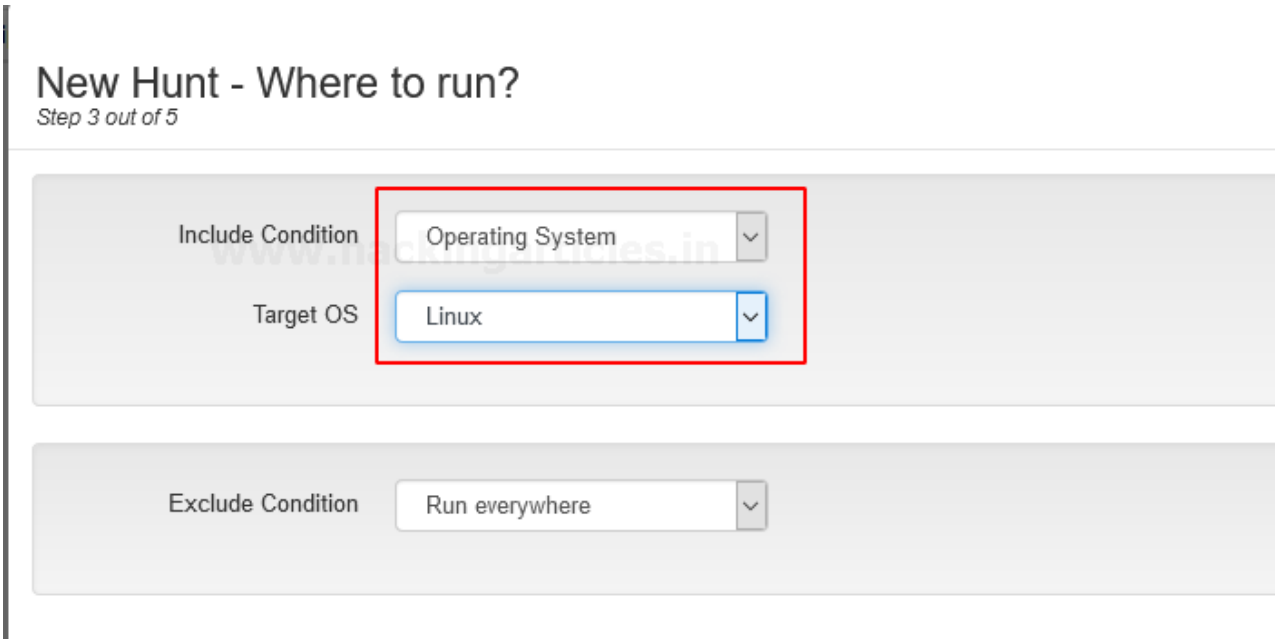
```
Linux.Applications.Chrome.Extensions
Linux.Applications.Chrome.Extensions.Upload
Linux.Applications.Docker.Info
Linux.Applications.Docker.Version
Linux.Debian.AptSources
Linux.Debian.Packages
Linux.Mounts
Linux.OSQuery.Generic
Linux.Proc.Arp
Linux.Proc.Modules
Linux.Search.FileFinder
Linux.Ssh.AuthorizedKeys
Linux.Ssh.KnownHosts
Linux.Ssh.PrivateKeys
Linux.Sys.ACPITables
Linux.Sys.BashShell
Linux.Sys.CPUTime
Linux.Sys.Crontab
Linux.Sys.LastUserLogin
Linux.Sys.Maps
Linux.Sys.Pslist
Linux.Sys.SUID
Linux.Sys.Users
Linux.Syslog.SSHLogin
```

In my case, I'm selecting Linux.Sys.SUID, Linux.Syslog.SSHLogin you can select as much you want.



After selecting next, it will redirect to next prompt where you need to give Hunt Description and then select **"Next"**

Hunt conditions should be in "**operating system"** select it in the drop-down menu of Include Condition then select Target OS **"Linux"** and then hit **"Next"**



At the next screen, you have your hunt Description or Artifact review, now a select the option **"Create Hunt"**

Now we have created a new Hunt Named Linux Hunt it reflects on our Hunts panel And We would like to run this hunt by pressing the play button to see what's next in the result…

Mode	FullPath	Size
ugrwxr-xr-x	/usr/lib/xorg/Xorg.wrap	14488
urwxr-xr--	/usr/lib/dbus-1.0/dbus-daemon-launch-helper	51344
urwxr-xr--	/usr/sbin/pppd	395144
urwxr-xr-x	/usr/bin/chfn	85064
urwxr-xr-x	/usr/bin/chsh	53040
urwxr-xr-x	/usr/bin/cp	153976
urwxr-xr-x	/usr/bin/fusermount	39144
urwxr-xr-x	/usr/bin/gpasswd	88464
urwxr-xr-x	/usr/bin/mount	55528
urwxr-xr-x	/usr/bin/newgrp	44784

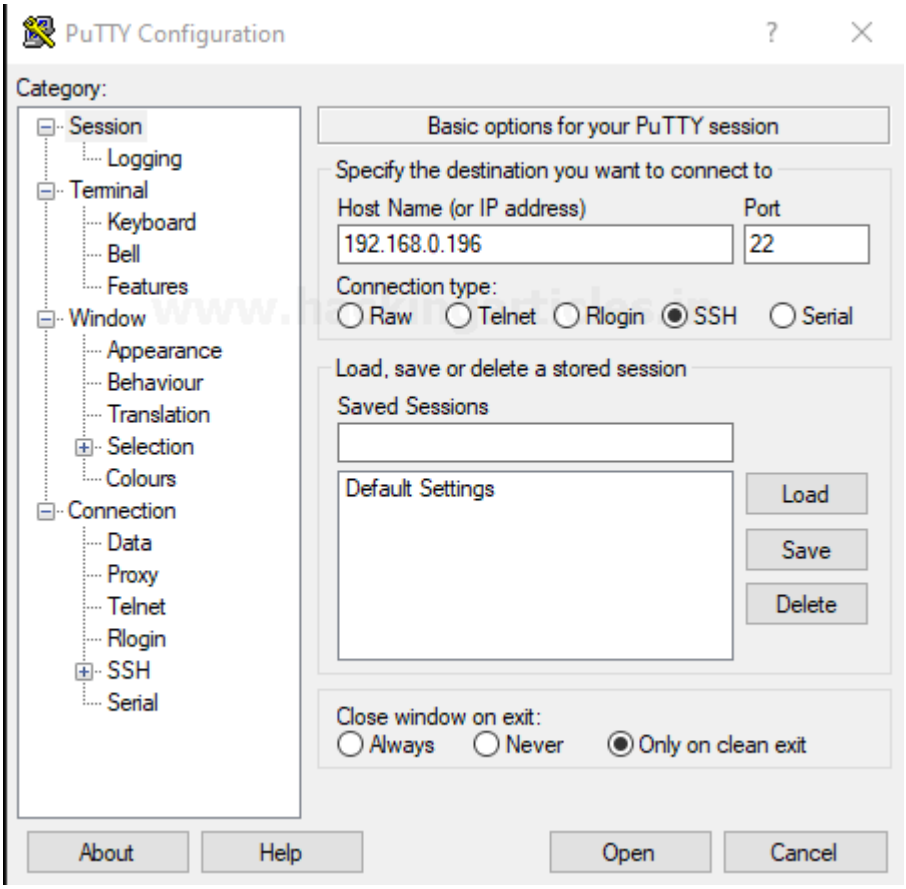
Wow !! As we can see here is the list of Linux system SUID

Wait this is not enough… Let's Dig it more Deeper

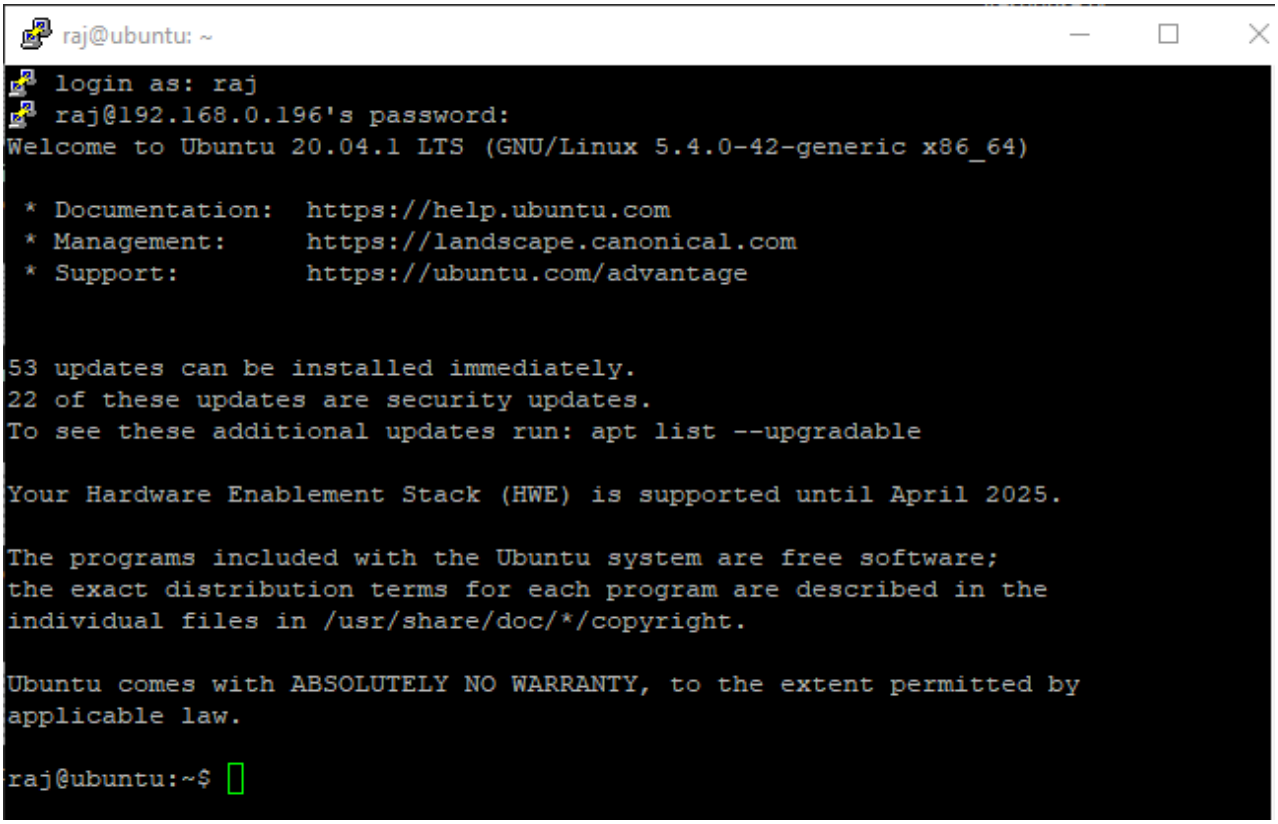
Let's take SSH of Linux client from Putty and perform a Brute-force attack from Attacker machine Kali Linux

Exited? let's do it !!

open Putty and enter the IP and port no. of the client and open the session



After the opening of the SSH shell login to the Client machine



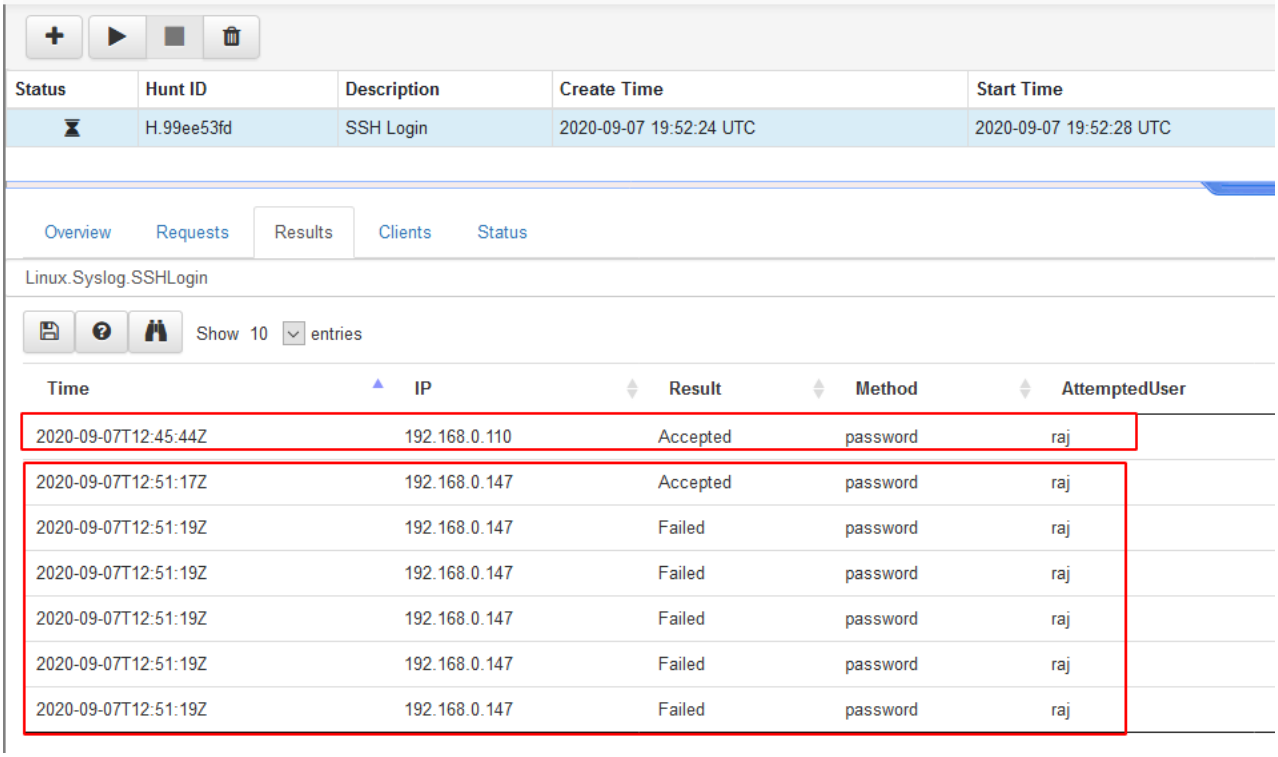
Nice !! we have successfully logged in to the client machine Let's perform a Brute-force attack to check is Velociraptor able to detect the attack or not. Fire up the Attacker machine Kali Linux and run the following command

```
hydra -l raj -P pass.txt 192.168.0.196 ssh
```

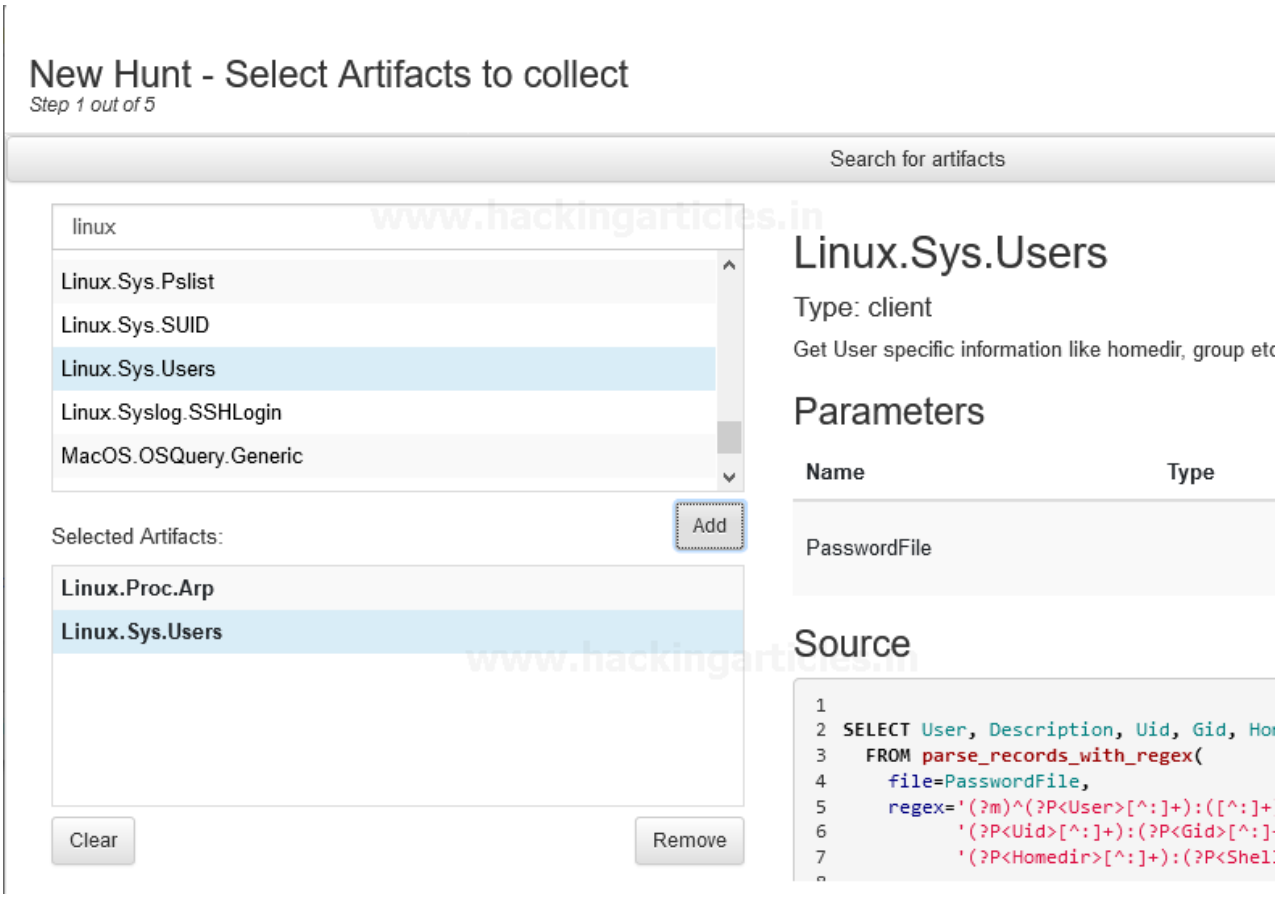
```
root@kali:~# hydra -l raj -P pass.txt 192.168.0.196 ssh
Hydra v9.0 (c) 2019 by van Hauser/THC - Please do not use in military or secret serv

Hydra (https://github.com/vanhauser-thc/thc-hydra) starting at 2020-09-07 15:51:17
[WARNING] Many SSH configurations limit the number of parallel tasks, it is recommen
[DATA] max 6 tasks per 1 server, overall 6 tasks, 6 login tries (l:1/p:6), ~1 try pe
[DATA] attacking ssh://192.168.0.196:22/
[22][ssh] host: 192.168.0.196   login: raj   password: 123
1 of 1 target successfully completed, 1 valid password found
Hydra (https://github.com/vanhauser-thc/thc-hydra) finished at 2020-09-07 15:51:20
```

Let's check what happened to the GUI interface of Velociraptor.

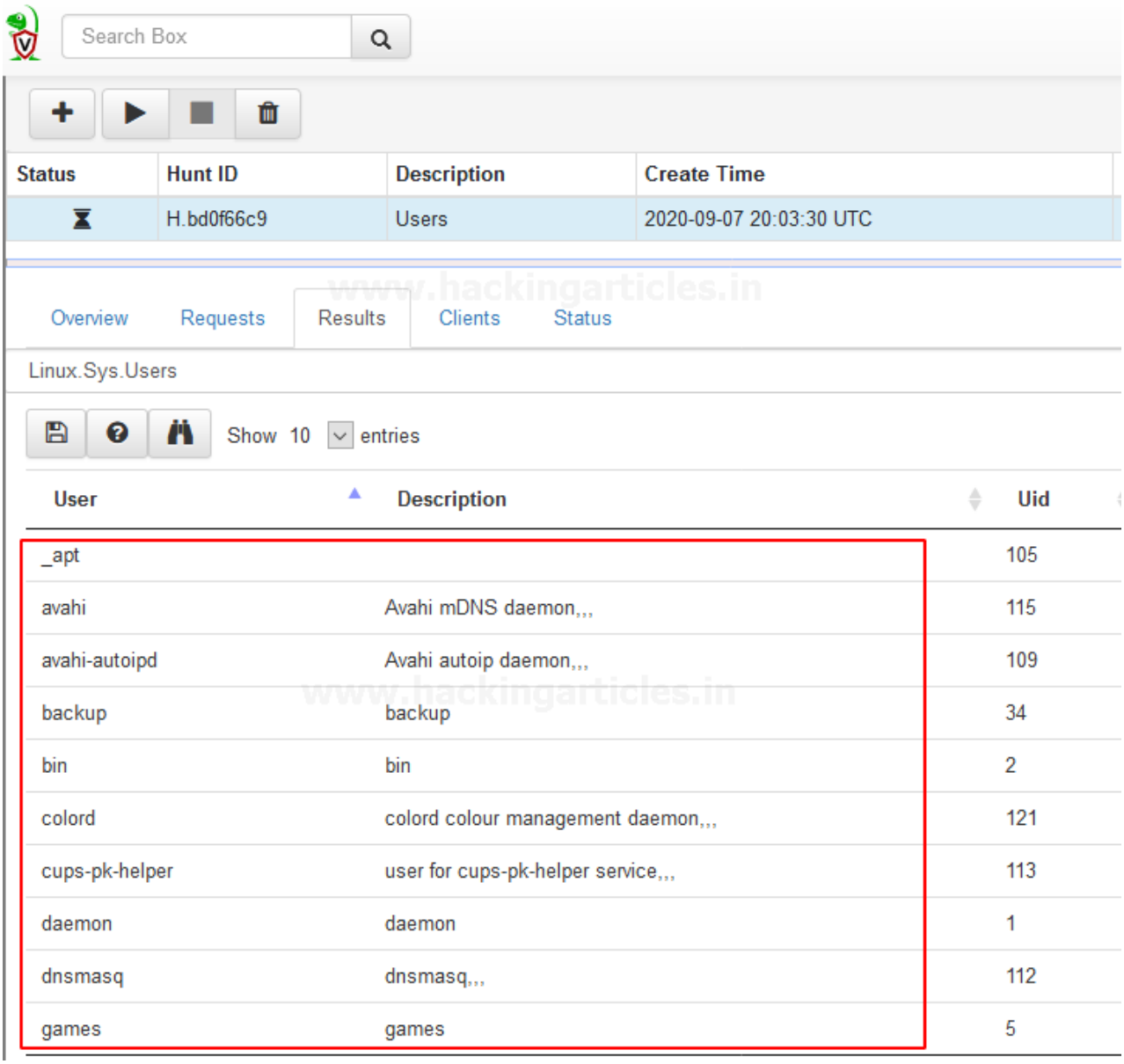
Hold tight !!



wow !! As we can see it detects and shows 2 successful logins of different machines and 5 failed login attempts just because of Brute force Attack. Let's check some more artifacts that show the Arp requests and Linux system users.

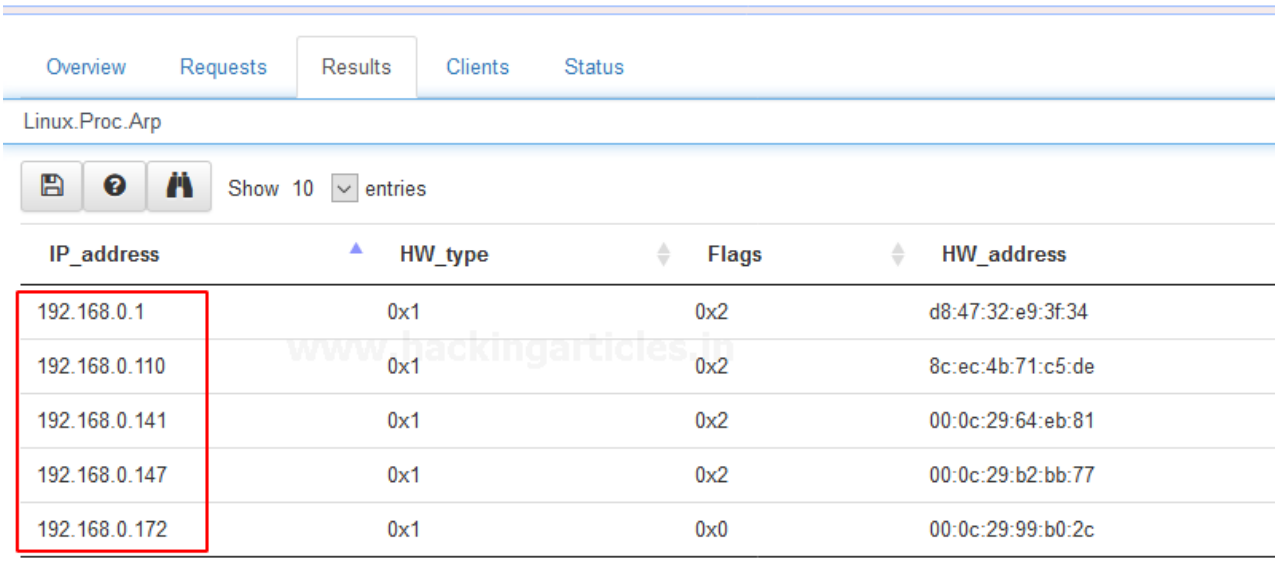


After creating the Hunt go to the result section and check what happens there…



As we can see it shows All Linux system users with their “UID” and a small description of the role of users.

Let’s check the “ARP” requests on the client



Wow !! it contains quite enough useful information.

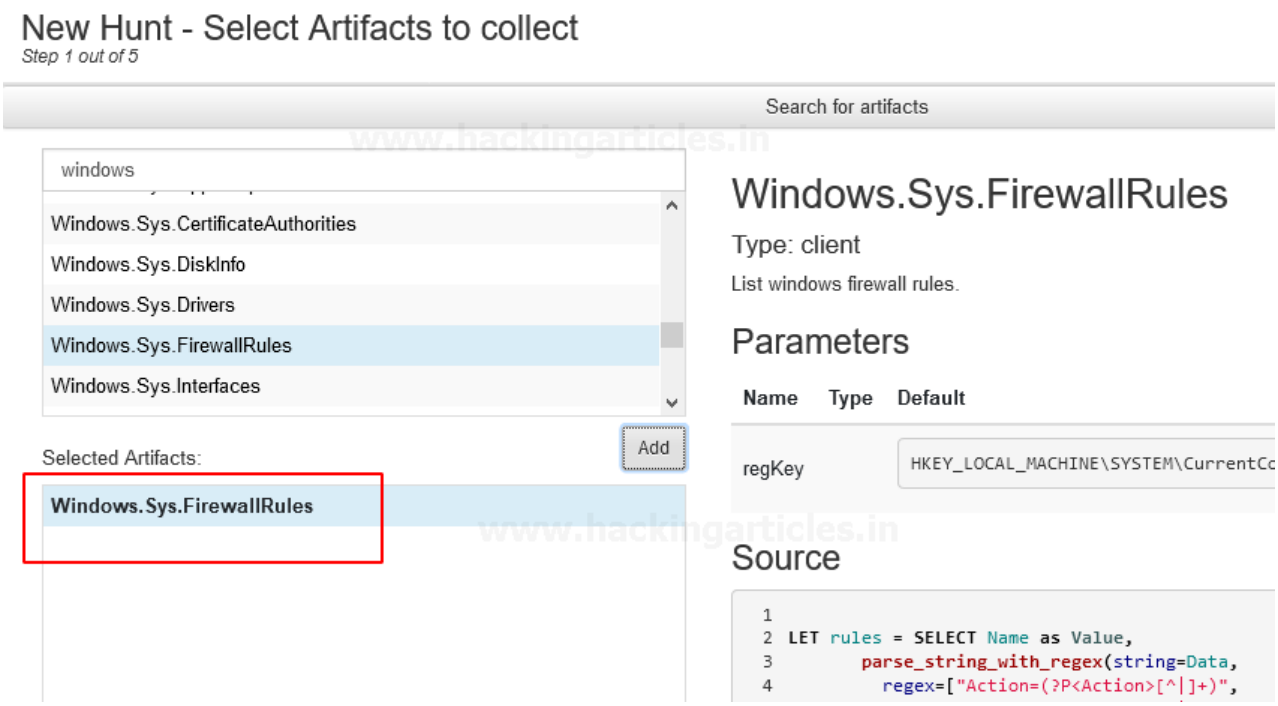
Based on these artifacts you can investigate the scene or your client by creating Hunt as per your requirements also you can create your artifacts if you have good knowledge of VQL.

Let's investigate our Windows client !!

Form Dashboard set the host to windows or whatever the client's computer name.

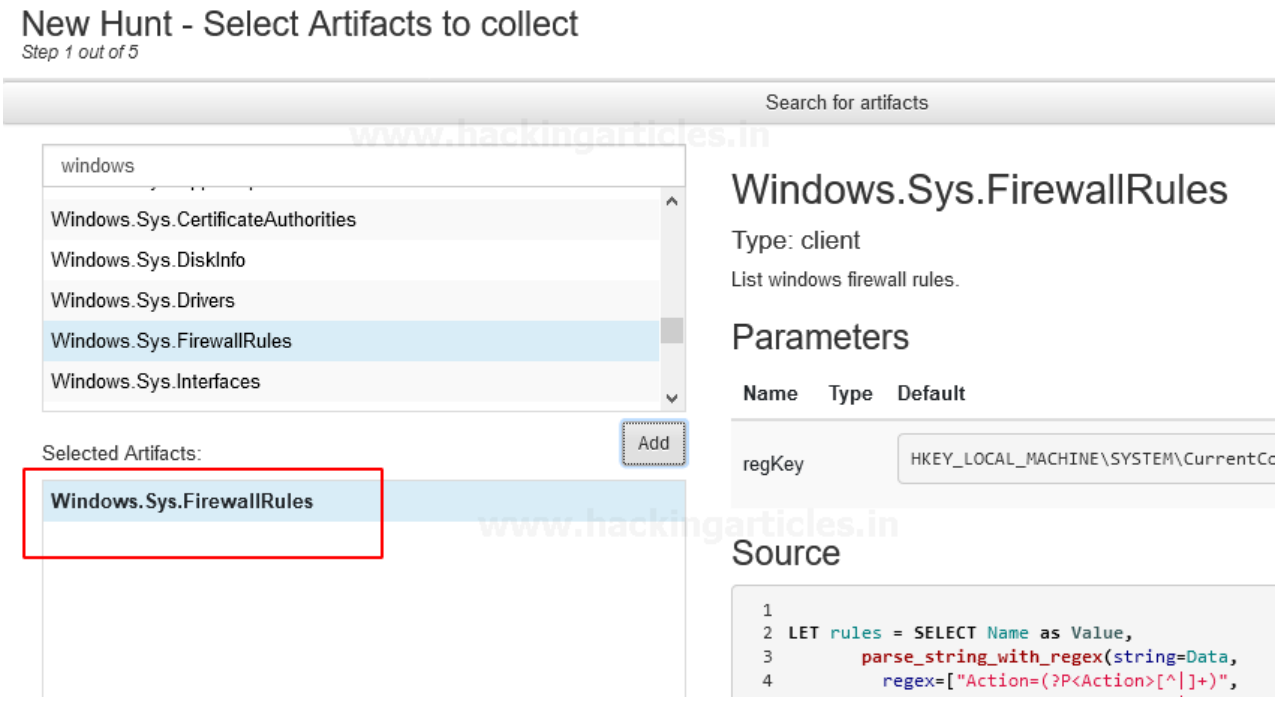
Then create a Hunt

I'm going to use Artifact "**Windows.Sys.FirewallRules**"



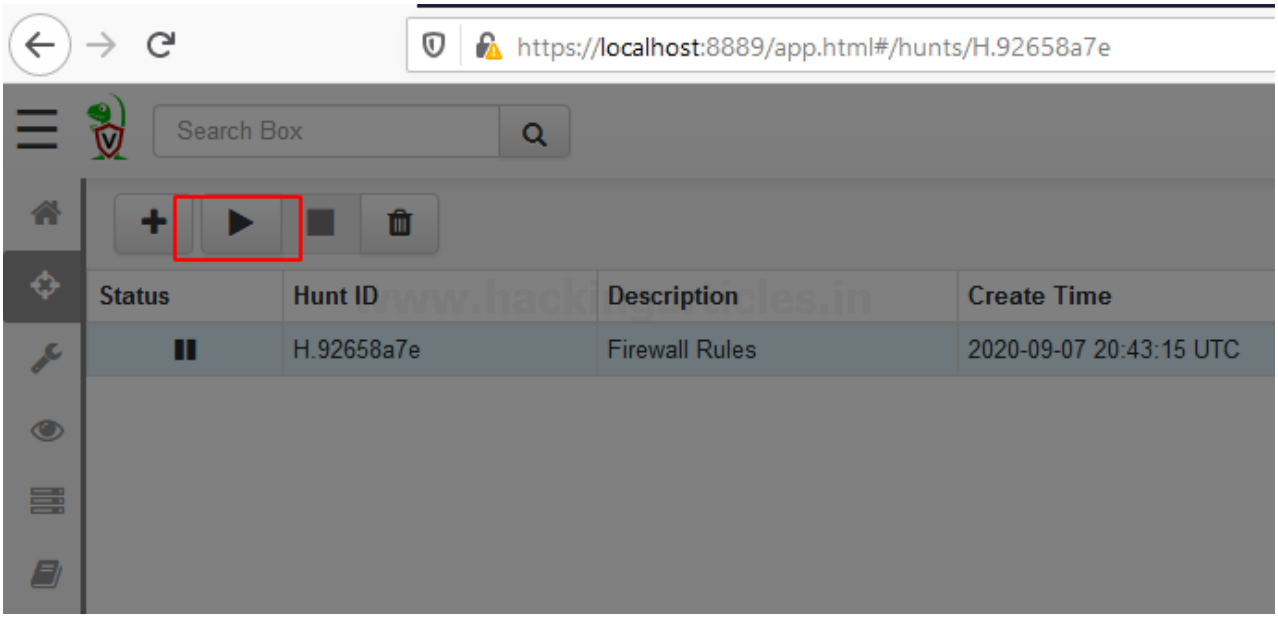
After selecting next it redirects you to next prompt when you need to Hunt Description and then select **"Next"**

Hunt conditions should be in "**operating system"** select it in the drop-down menu of Include Condition then select Target OS **"Windows"** and then hit **"Next"**

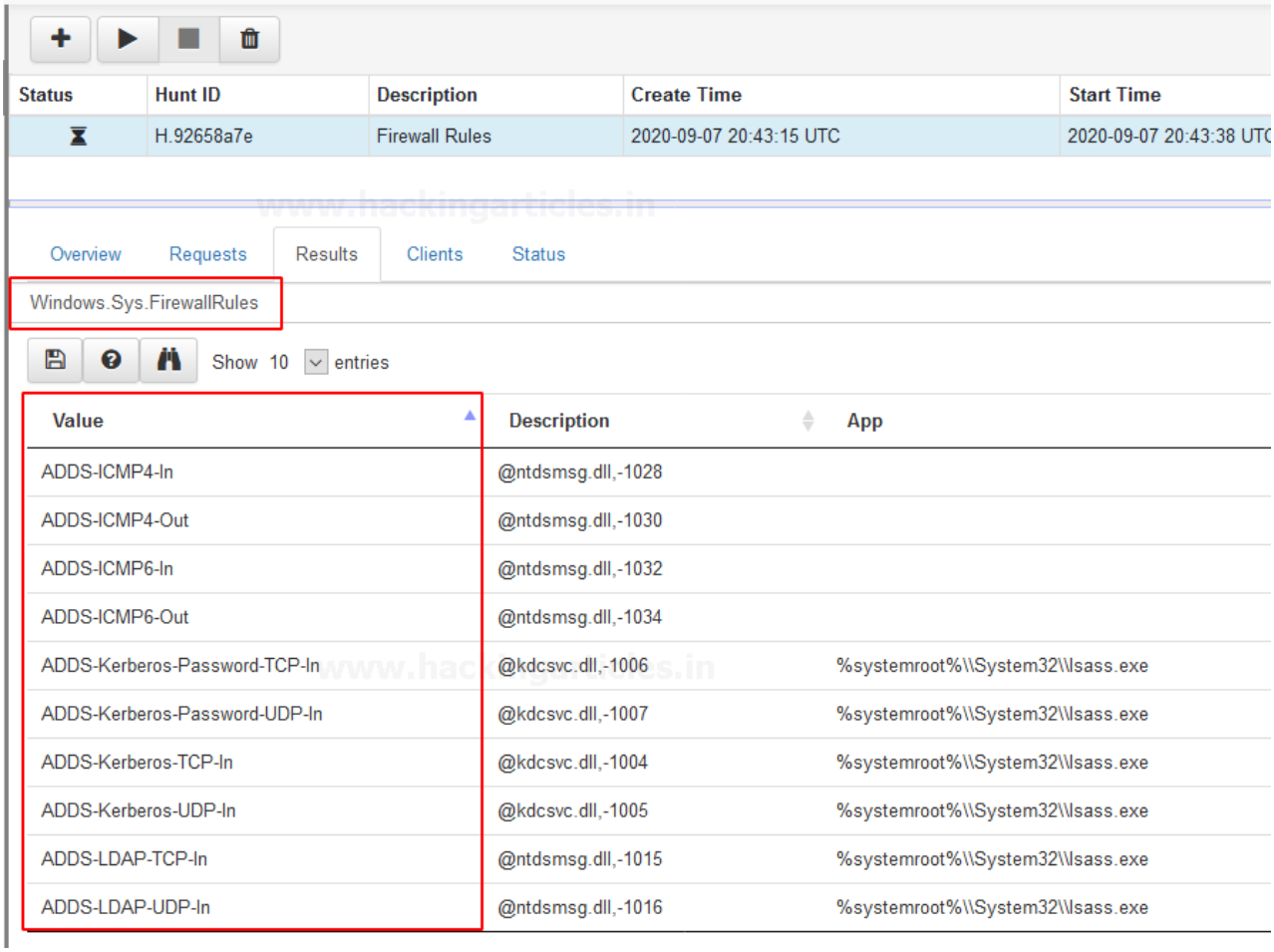


Now we have created a new Hunt Named Windows Hunt it reflects your Hunts panel And We would like to run this hunt by pressing the play button to see what's next in the result…

Let's check the result. Hold tight !!



Let's check the result. Hold tight !!



Status	Hunt ID	Description	Create Time	Start Time
⧗	H.92658a7e	Firewall Rules	2020-09-07 20:43:15 UTC	2020-09-07 20:43:38 UTC

Overview | Requests | Results | Clients | Status

Windows.Sys.FirewallRules

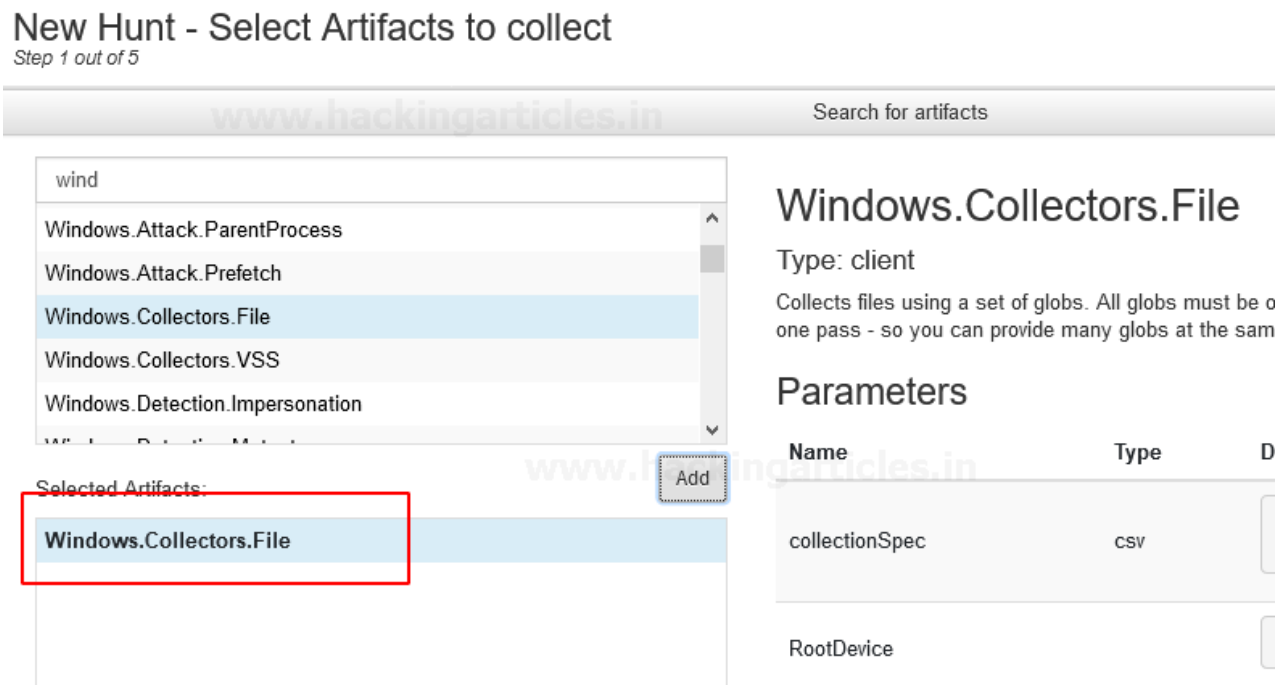
Show 10 entries

Value	Description	App
ADDS-ICMP4-In	@ntdsmsg.dll,-1028	
ADDS-ICMP4-Out	@ntdsmsg.dll,-1030	
ADDS-ICMP6-In	@ntdsmsg.dll,-1032	
ADDS-ICMP6-Out	@ntdsmsg.dll,-1034	
ADDS-Kerberos-Password-TCP-In	@kdcsvc.dll,-1006	%systemroot%\\System32\\lsass.exe
ADDS-Kerberos-Password-UDP-In	@kdcsvc.dll,-1007	%systemroot%\\System32\\lsass.exe
ADDS-Kerberos-TCP-In	@kdcsvc.dll,-1004	%systemroot%\\System32\\lsass.exe
ADDS-Kerberos-UDP-In	@kdcsvc.dll,-1005	%systemroot%\\System32\\lsass.exe
ADDS-LDAP-TCP-In	@ntdsmsg.dll,-1015	%systemroot%\\System32\\lsass.exe
ADDS-LDAP-UDP-In	@ntdsmsg.dll,-1016	%systemroot%\\System32\\lsass.exe

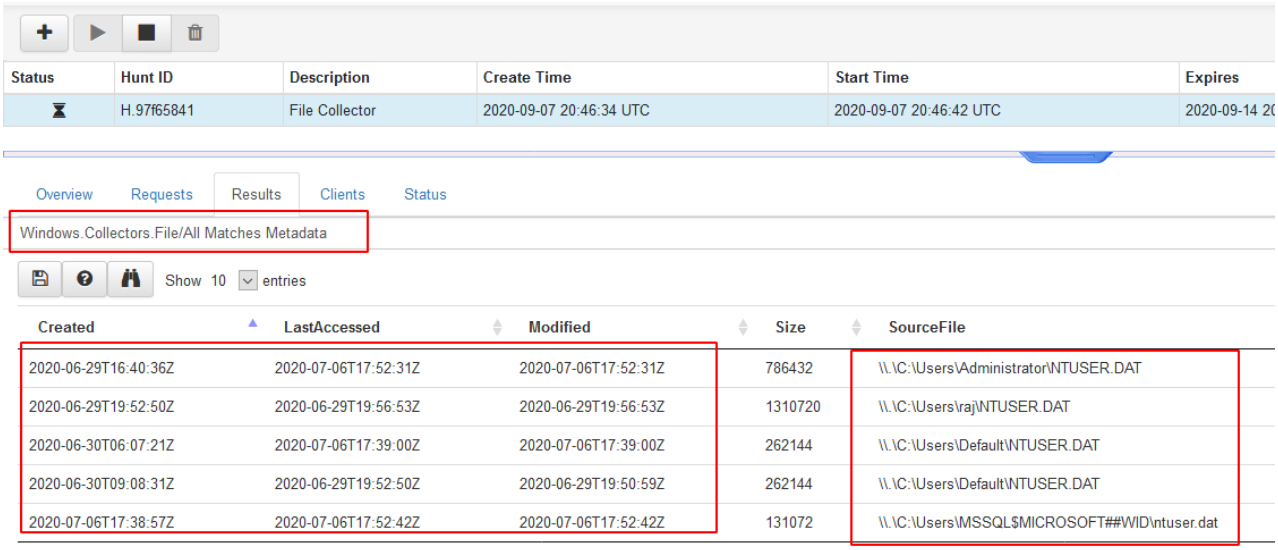
Nice !! Here is the list of implemented Firewall Rule on the Client's machine.

Let's check out some more artifacts to dig it deeper.

Create a new hunt and add many artifacts as you want. Here I'm going to use "Windows.Collectors.File"



Let’s check what comes in result…..



Status	Hunt ID	Description	Create Time	Start Time	Expires
⧗	H.97f65841	File Collector	2020-09-07 20:46:34 UTC	2020-09-07 20:46:42 UTC	2020-09-14 2(

Overview | Requests | Results | Clients | Status

Windows.Collectors.File/All Matches Metadata

Show 10 entries

Created	LastAccessed	Modified	Size	SourceFile
2020-06-29T16:40:36Z	2020-07-06T17:52:31Z	2020-07-06T17:52:31Z	786432	\\.\C:\Users\Administrator\NTUSER.DAT
2020-06-29T19:52:50Z	2020-06-29T19:56:53Z	2020-06-29T19:56:53Z	1310720	\\.\C:\Users\raj\NTUSER.DAT
2020-06-30T06:07:21Z	2020-07-06T17:39:00Z	2020-07-06T17:39:00Z	262144	\\.\C:\Users\Default\NTUSER.DAT
2020-06-30T09:08:31Z	2020-06-29T19:52:50Z	2020-06-29T19:50:59Z	262144	\\.\C:\Users\Default\NTUSER.DAT
2020-07-06T17:38:57Z	2020-07-06T17:52:42Z	2020-07-06T17:52:42Z	131072	\\.\C:\Users\MSSQL$MICROSOFT##WID\ntuser.dat

Wow!! As we can see it listed the All matches Metadata of windows.collectors

Similarly, you can Dig it much Deeper by adding as many artifacts as you need

Hang tight this is not enough!

More will be discussed in part3.

Author – Vijay is a Certified Ethical Hacker, Technical writer and Penetration Tester at Hacking Articles. Technology and Gadget freak. Contact **Here**