Kelompok:
2501981270 - AGUSTINUS LEONARDO DWITAMA
2501989550 - MUHAMAD DWI APRIYANTO
2502001864 - RAVI DEEVAN SATYAKI
2501965052 - KEVIN MORRIS ARMANDO
2501983723 - NATANAEL FRANSISCO

Shylock via Volatility

Image Analysis

```
D:\DEEVAN\SEMESTER 5\Computer Forensic\volatility_2.6_win64_standalone\volatility_2.6_win64_standalone>.\volatility_2.6_
win64_standalone.exe imageinfo -f shylock.vmem
Volatility Foundation Volatility Framework 2.6
INFO    : volatility.debug    : Determining profile based on KDBG search...
          Suggested Profile(s) : WinXPSP2x86, WinXPSP3x86 (Instantiated with WinXPSP2x86)
                     AS Layer1 : IA32PagedMemoryPae (Kernel AS)
                     AS Layer2 : FileAddressSpace (D:\DEEVAN\SEMESTER 5\Computer Forensic\volatility_2.6_win64_standalon
e\volatility_2.6_win64_standalone\shylock.vmem)
                      PAE type : PAE
                           DTB : 0x319000L
                          KDBG : 0x80545b60L
          Number of Processors : 1
     Image Type (Service Pack) : 3
                KPCR for CPU 0 : 0xffdff000L
             KUSER_SHARED_DATA : 0xffdf0000L
           Image date and time : 2011-09-30 00:26:30 UTC+0000
     Image local date and time : 2011-09-29 20:26:30 -0400
```

We have a Windows XP with ServicePack 2 on x86 environment.

Process Analysis

```
D:\DEEVAN\SEMESTER 5\Computer Forensic\volatility_2.6_win64_standalone\volatility_2.6_win64_standalone>.\volatility_2.6_win64_standalone.exe pslist -f shylock.vmem
Volatility Foundation Volatility Framework 2.6
Offset(V)  Name                    PID   PPID   Thds     Hnds   Sess  Wow64 Start                          Exit
---------- -------------------- ------ ------ ------ -------- ------ ------ ------------------------------ ------------------------------
0x819cc830 System                    4      0     60      209 ------      0

0x818efda0 smss.exe                384      4      3       19 ------      0 2011-09-26 01:33:32 UTC+0000
0x81616ab8 csrss.exe               612    384     12      473      0      0 2011-09-26 01:33:35 UTC+0000
0x814c9b40 winlogon.exe            636    384     16      498      0      0 2011-09-26 01:33:35 UTC+0000
0x81794d08 services.exe            680    636     15      271      0      0 2011-09-26 01:33:35 UTC+0000
0x814a2cd0 lsass.exe               692    636     24      356      0      0 2011-09-26 01:33:35 UTC+0000
0x815c2630 vmacthlp.exe            852    680      1       25      0      0 2011-09-26 01:33:35 UTC+0000
0x81470020 svchost.exe             868    680     17      199      0      0 2011-09-26 01:33:35 UTC+0000
0x818b5248 svchost.exe             944    680     11      274      0      0 2011-09-26 01:33:36 UTC+0000
0x813a0458 MsMpEng.exe            1040    680     16      322      0      0 2011-09-26 01:33:36 UTC+0000
0x816b7020 svchost.exe            1076    680     87     1477      0      0 2011-09-26 01:33:36 UTC+0000
0x817f7548 svchost.exe            1200    680      6       81      0      0 2011-09-26 01:33:37 UTC+0000
0x8169a1d0 svchost.exe            1336    680     14      172      0      0 2011-09-26 01:33:37 UTC+0000
0x813685e0 spoolsv.exe            1516    680     14      159      0      0 2011-09-26 01:33:39 UTC+0000
0x818f5cd0 explorer.exe           1752   1696     32      680      0      0 2011-09-26 01:33:45 UTC+0000
0x815c9638 svchost.exe            1812    680      4      102      0      0 2011-09-26 01:33:46 UTC+0000
0x8192d7f0 VMwareTray.exe         1876   1752      3       84      0      0 2011-09-26 01:33:46 UTC+0000
0x818f6458 VMwareUser.exe         1888   1752      9      245      0      0 2011-09-26 01:33:47 UTC+0000
0x8164a020 msseces.exe            1900   1752     11      205      0      0 2011-09-26 01:33:47 UTC+0000
0x81717370 ctfmon.exe             1912   1752      3       93      0      0 2011-09-26 01:33:47 UTC+0000
0x813a5b28 svchost.exe            2000    680      6      119      0      0 2011-09-26 01:33:47 UTC+0000
0x81336638 vmtoolsd.exe            200    680      5      234      0      0 2011-09-26 01:33:47 UTC+0000
0x81329b28 VMUpgradeHelper         424    680      5      100      0      0 2011-09-26 01:33:48 UTC+0000
0x812d6020 wscntfy.exe            2028   1076      3       63      0      0 2011-09-26 01:33:55 UTC+0000
0x812c1718 TPAutoConnSvc.e        2068    680      5       99      0      0 2011-09-26 01:33:55 UTC+0000
0x812b03e0 alg.exe                2272    680      7      112      0      0 2011-09-26 01:33:55 UTC+0000
0x81324020 TPAutoConnect.e        3372   2068      3       90      0      0 2011-09-26 01:33:59 UTC+0000
0x814e7b38 msiexec.exe            2396    680      5      127      0      0 2011-09-26 01:34:45 UTC+0000
0x814db608 cmd.exe                3756   1752      3       56      0      0 2011-09-30 00:20:44 UTC+0000
0x812f59a8 cmd.exe                3128    200      0 --------      0      0 2011-09-30 00:26:30 UTC+0000   2011-09-30 00:26:30 UTC+0000
```

pslist
command pslist digunakan untuk melihat list list process yang ada pada system. pslist akan menampilkan offset, process name, process ID, the parent process ID, number of threads, number of handles, dan date/time kapan mulai dan berakhirnya suatu process.

```
D:\DEEVAN\SEMESTER 5\Computer Forensic\volatility_2.6_win64_standalone\volatility_2.6_w
in64_standalone>.\volatility_2.6_win64_standalone.exe connscan -f shylock.vmem
Volatility Foundation Volatility Framework 2.6
Offset(P)  Local Address             Remote Address            Pid
---------- ------------------------ ------------------------ ---
0x014f6ab0 10.0.0.109:1072          209.190.4.84:443          1752
0x01507380 10.0.0.109:1073          209.190.4.84:443          1752
0x016c2b00 10.0.0.109:1065          184.173.252.227:443       1752
0x017028a0 10.0.0.109:1067          184.173.252.227:443       1752
0x01858cb0 10.0.0.109:1068          209.190.4.84:443          1752
```

Connscan

Connscan digunakan untuk melakukan scanning pada tag pool di memori, sehingga memungkinkan untuk menemukan jejak dari koneksi yang sebelumnya sudah berakhir maupun koneksi yang masih aktif. PID 1752 menunjukan bahwa masih aktif, jika PID 0 artinya kemungkinan sudah tidak aktif.

network activity dari PID 1752 (explorer.exe) dapat dikatakan cukup janggal karena seharusnya explorer.exe tidak membuat network traffic.

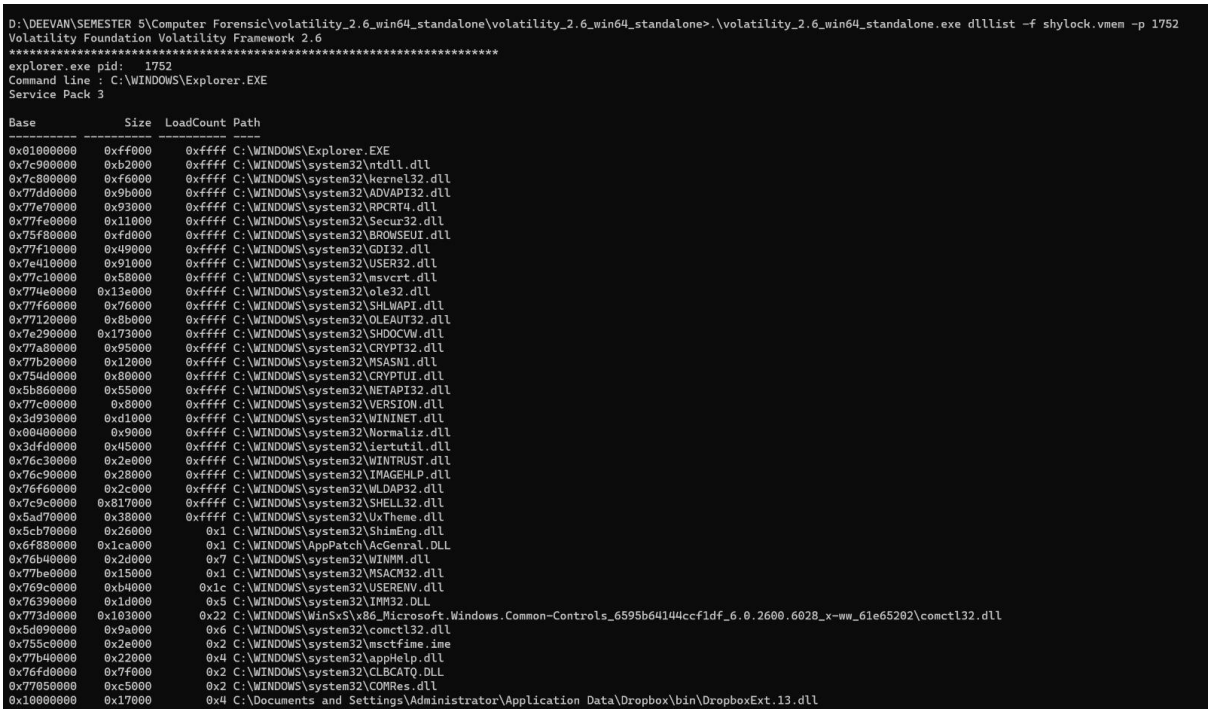
```
D:\DEEVAN\SEMESTER 5\Computer Forensic\volatility_2.6_win64_standalone\volatility_2.6_win64_standalone>.\volatility_2.6_win64_standalone.exe sockets -f shylock.vmem
Volatility Foundation Volatility Framework 2.6
Offset(V)       PID   Port  Proto Protocol        Address         Create Time
---------- -------- ------ ------ --------------- --------------- -----------
0x812b15d0        4      0     47 GRE             0.0.0.0         2011-09-26 01:33:56 UTC+0000
0x812a8008        4   1030      6 TCP             0.0.0.0         2011-09-26 01:33:56 UTC+0000
0x813a5728      692    500     17 UDP             0.0.0.0         2011-09-26 01:33:47 UTC+0000
0x812a9b60     2272   1028      6 TCP             127.0.0.1       2011-09-26 01:33:56 UTC+0000
0x814c4008     1752   1073      6 TCP             0.0.0.0         2011-09-30 00:25:39 UTC+0000
0x818a3bf8        4    445      6 TCP             0.0.0.0         2011-09-26 01:33:32 UTC+0000
0x8179e730      944    135      6 TCP             0.0.0.0         2011-09-26 01:33:36 UTC+0000
0x812ade38     1076   1076     17 UDP             127.0.0.1       2011-09-30 00:26:30 UTC+0000
0x813a4e98     1752   1070      6 TCP             0.0.0.0         2011-09-30 00:25:34 UTC+0000
0x816711c8     1076    123     17 UDP             127.0.0.1       2011-09-30 00:26:30 UTC+0000
0x816757d0      692      0    255 Reserved        0.0.0.0         2011-09-26 01:33:47 UTC+0000
0x815bb708     1752   1067      6 TCP             0.0.0.0         2011-09-30 00:25:33 UTC+0000
0x812bb008     1336   1900     17 UDP             127.0.0.1       2011-09-30 00:26:30 UTC+0000
0x81904478      692   4500     17 UDP             0.0.0.0         2011-09-26 01:33:47 UTC+0000
0x814c9008        4    445     17 UDP             0.0.0.0         2011-09-26 01:33:32 UTC+0000
```

0x814c4008 1752 1073 6 TCP 0.0.0.0 2011-09-30 00:25:39 UTC+0000
0x813a4e98 1752 1070 6 TCP 0.0.0.0 2011-09-30 00:25:34 UTC+0000
0x815bb708 1752 1067 6 TCP 0.0.0.0 2011-09-30 00:25:33 UTC+0000

Sockets

sockets digunakan untuk mendeteksi socket-socket yang sedang listening untuk berbagai protocol. Socket yang dimaksud adalah Network Sockets yang digunakan untuk komunikasi antar proses yang berjalan di mesin yang berbeda melalui jaringan.

Pada gambar di atas menunjukkan bahwa PID 1752 yaitu explorer.exe sudah memiliki socket pada berbagai port yang artinya memiliki koneksi dengan server luar.



```
D:\DEEVAN\SEMESTER 5\Computer Forensic\volatility_2.6_win64_standalone\volatility_2.6_win64_standalone>.\volatility_2.6_win64_standalone.exe dlllist -f shylock.vmem -p 1752
Volatility Foundation Volatility Framework 2.6
************************************************************************
explorer.exe pid:   1752
Command line : C:\WINDOWS\Explorer.EXE
Service Pack 3

Base             Size  LoadCount Path
---------- ---------- ---------- ----
0x01000000    0xff000     0xffff C:\WINDOWS\Explorer.EXE
0x7c900000    0xb2000     0xffff C:\WINDOWS\system32\ntdll.dll
0x7c800000    0xf6000     0xffff C:\WINDOWS\system32\kernel32.dll
0x77dd0000    0x9b000     0xffff C:\WINDOWS\system32\ADVAPI32.dll
0x77e70000    0x93000     0xffff C:\WINDOWS\system32\RPCRT4.dll
0x77fe0000    0x11000     0xffff C:\WINDOWS\system32\Secur32.dll
0x75f80000    0xfd000     0xffff C:\WINDOWS\system32\BROWSEUI.dll
0x77f10000    0x49000     0xffff C:\WINDOWS\system32\GDI32.dll
0x7e410000    0x91000     0xffff C:\WINDOWS\system32\USER32.dll
0x77c10000    0x58000     0xffff C:\WINDOWS\system32\msvcrt.dll
0x774e0000   0x13e000     0xffff C:\WINDOWS\system32\ole32.dll
0x77f60000    0x76000     0xffff C:\WINDOWS\system32\SHLWAPI.dll
0x77120000    0x8b000     0xffff C:\WINDOWS\system32\OLEAUT32.dll
0x7e290000   0x173000     0xffff C:\WINDOWS\system32\SHDOCVW.dll
0x77a80000    0x95000     0xffff C:\WINDOWS\system32\CRYPT32.dll
0x77b20000    0x12000     0xffff C:\WINDOWS\system32\MSASN1.dll
0x754d0000    0x80000     0xffff C:\WINDOWS\system32\CRYPTUI.dll
0x5b860000    0x55000     0xffff C:\WINDOWS\system32\NETAPI32.dll
0x77c00000     0x8000     0xffff C:\WINDOWS\system32\VERSION.dll
0x3d930000    0xd1000     0xffff C:\WINDOWS\system32\WININET.dll
0x00400000     0x9000     0xffff C:\WINDOWS\system32\Normaliz.dll
0x3dfd0000    0x45000     0xffff C:\WINDOWS\system32\iertutil.dll
0x76c30000    0x2e000     0xffff C:\WINDOWS\system32\WINTRUST.dll
0x76c90000    0x28000     0xffff C:\WINDOWS\system32\IMAGEHLP.dll
0x76f60000    0x2c000     0xffff C:\WINDOWS\system32\WLDAP32.dll
0x7c9c0000   0x817000     0xffff C:\WINDOWS\system32\SHELL32.dll
0x5ad70000    0x38000     0xffff C:\WINDOWS\system32\UxTheme.dll
0x5cb70000    0x26000        0x1 C:\WINDOWS\system32\ShimEng.dll
0x6f880000   0x1ca000        0x1 C:\WINDOWS\AppPatch\AcGenral.DLL
0x76b40000    0x2d000        0x7 C:\WINDOWS\system32\WINMM.dll
0x77be0000    0x15000        0x1 C:\WINDOWS\system32\MSACM32.dll
0x769c0000    0xb4000       0x1c C:\WINDOWS\system32\USERENV.dll
0x76390000    0x1d000        0x5 C:\WINDOWS\system32\IMM32.DLL
0x773d0000   0x103000       0x22 C:\WINDOWS\WinSxS\x86_Microsoft.Windows.Common-Controls_6595b64144ccf1df_6.0.2600.6028_x-ww_61e65202\comctl32.dll
0x5d090000    0x9a000        0x6 C:\WINDOWS\system32\comctl32.dll
0x755c0000    0x2e000        0x2 C:\WINDOWS\system32\msctfime.ime
0x77b40000    0x22000        0x4 C:\WINDOWS\system32\appHelp.dll
0x76fd0000    0x7f000        0x2 C:\WINDOWS\system32\CLBCATQ.DLL
0x77050000    0xc5000        0x2 C:\WINDOWS\system32\COMRes.dll
0x10000000    0x17000        0x4 C:\Documents and Settings\Administrator\Application Data\Dropbox\bin\DropboxExt.13.dll
```

0x4d4f0000 0x59000 0xd C:\WINDOWS\system32\WINHTTP.dll
0x76f20000 0x27000 0x3 C:\WINDOWS\system32\DNSAPI.dll
0x75e60000 0x13000 0xb C:\WINDOWS\system32\cryptnet.dll
0x662b0000 0x58000 0x2 C:\WINDOWS\system32\hnetcfg.dll
0x71a90000 0x8000 0x1 C:\WINDOWS\System32\wshtcpip.dll

dlllist
dlllist digunakan untuk menampilkan dll (Dynamic Link Library).
untuk menampilkan dll pada proses tertentu dapat menggunakan filter -p atau -pid seperti yg ditunjukan pada gambar di atas.
Beberapa dll yang mencurigakan dan seharusnya tidak digunakan oleh explorer.exe yaitu WINHTTP.dll dan cryptnet.dll karena dll tersebut merupakan networking modules.

```
C:\Users\natan\Downloads\Compressed\volatility_2.6_win64_standalone>volatility_2.6_win64_standalone.exe -f shylock.vmem -p 1752 malfind -D ./
Volatility Foundation Volatility Framework 2.6
Process: explorer.exe Pid: 1752 Address: 0x3380000
Vad Tag: VadS Protection: PAGE_EXECUTE_READWRITE
Flags: CommitCharge: 151, MemCommit: 1, PrivateMemory: 1, Protection: 6

0x03380000  4d 5a 90 00 03 00 00 00 04 00 00 00 ff ff 00 00   MZ..............
0x03380010  b8 00 00 00 00 00 00 00 40 00 00 00 00 00 00 00   ........@.......
0x03380020  00 00 00 00 00 00 00 00 00 00 00 00 e4 02 00 20 09 00   ...............
0x03380030  00 00 00 00 00 00 00 00 00 00 00 00 01 00 00   ...............

0x03380000 4d              DEC EBP
0x03380001 5a              POP EDX
0x03380002 90              NOP
0x03380003 0003            ADD [EBX], AL
0x03380005 0000            ADD [EAX], AL
0x03380007 000400          ADD [EAX+EAX], AL
0x0338000a 0000            ADD [EAX], AL
0x0338000c ff              DB 0xff
0x0338000d ff00            INC DWORD [EAX]
0x0338000f 00b800000000    ADD [EAX+0x0], BH
0x03380015 0000            ADD [EAX], AL
0x03380017 004000          ADD [EAX+0x0], AL
0x0338001a 0000            ADD [EAX], AL
0x0338001c 0000            ADD [EAX], AL
0x0338001e 0000            ADD [EAX], AL
0x03380020 0000            ADD [EAX], AL
0x03380022 0000            ADD [EAX], AL
0x03380024 0000            ADD [EAX], AL
0x03380026 0000            ADD [EAX], AL
0x03380028 0000            ADD [EAX], AL
0x0338002a e402            IN AL, 0x2
0x0338002c 0020            ADD [EAX], AH
0x0338002e 0900            OR [EAX], EAX
0x03380030 0000            ADD [EAX], AL
0x03380032 0000            ADD [EAX], AL
0x03380034 0000            ADD [EAX], AL
0x03380036 0000            ADD [EAX], AL
0x03380038 0000            ADD [EAX], AL
0x0338003a 0000            ADD [EAX], AL
0x0338003c 0001            ADD [ECX], AL
0x0338003e 0000            ADD [EAX], AL
```

```
Process: explorer.exe Pid: 1752 Address: 0x36e0000
Vad Tag: VadS Protection: PAGE_EXECUTE_READWRITE
Flags: CommitCharge: 151, MemCommit: 1, PrivateMemory: 1, Protection: 6

0x036e0000  4d 5a 90 00 03 00 00 00 04 00 00 00 ff ff 00 00   MZ..............
0x036e0010  b8 00 00 00 00 00 00 00 40 00 00 00 00 00 00 00   ........@.......
0x036e0020  00 00 00 00 00 00 00 00 00 00 00 00 56 03 00 20 09 00   .........V.....
0x036e0030  00 00 00 00 00 00 00 00 00 00 00 00 01 00 00   ...............

0x036e0000 4d              DEC EBP
0x036e0001 5a              POP EDX
0x036e0002 90              NOP
0x036e0003 0003            ADD [EBX], AL
0x036e0005 0000            ADD [EAX], AL
0x036e0007 000400          ADD [EAX+EAX], AL
0x036e000a 0000            ADD [EAX], AL
0x036e000c ff              DB 0xff
0x036e000d ff00            INC DWORD [EAX]
0x036e000f 00b800000000    ADD [EAX+0x0], BH
0x036e0015 0000            ADD [EAX], AL
0x036e0017 004000          ADD [EAX+0x0], AL
0x036e001a 0000            ADD [EAX], AL
0x036e001c 0000            ADD [EAX], AL
0x036e001e 0000            ADD [EAX], AL
0x036e0020 0000            ADD [EAX], AL
0x036e0022 0000            ADD [EAX], AL
0x036e0024 0000            ADD [EAX], AL
0x036e0026 0000            ADD [EAX], AL
0x036e0028 0000            ADD [EAX], AL
0x036e002a 56              PUSH ESI
0x036e002b 0300            ADD EAX, [EAX]
0x036e002d 2009            AND [ECX], CL
0x036e002f 0000            ADD [EAX], AL
0x036e0031 0000            ADD [EAX], AL
0x036e0033 0000            ADD [EAX], AL
0x036e0035 0000            ADD [EAX], AL
0x036e0037 0000            ADD [EAX], AL
0x036e0039 0000            ADD [EAX], AL
0x036e003b 0000            ADD [EAX], AL
0x036e003d 0100            ADD [EAX], EAX
0x036e003f 00              DB 0x0
```

malfind

malfind berfungsi untuk menemukan code atau dll yang tersembunyi atau yang sudah dimasukkan ke dalam memori.

hasilnya menunjukkan terdapat MZ header.

Today			
process.0x818f5cd0.0x36e0000.dmp	12/2/2023 6:40 PM	DMP File	604 KB
process.0x818f5cd0.0x3380000.dmp	12/2/2023 6:40 PM	DMP File	604 KB

memdump

memdump berfungsi untuk dump memori yang diinginkan.

```
3=R|
48Vv
?"M|
w[(@
N0TRUE
Bad size of the file of a inject.
Bad signature of the file of a inject.
Bad control sum of the file of a inject.
Cannot allocate memory. (NEW)
Cannot inflate the file of a inject. (zlib_inflate_gzip::error=%d)
1.2.3
CreateFile %s
new::ASSERTE(0) %s
ReadFile %s
Cannot find pair last tag '>' %s
Cannot find the end tag '>' %s
Schema:
invalid vector<T> subscript
deque<T> too long
%02x%02x%02x%02x%02x%02x%02x%02x%02x%02x%02x%02x%02x%02x%02x%02x
File::IsFileExist( pFullFileName )=%s (%s)
```

```
sl,E
HeapDestroyPtr == NULL
***isInject=%s
FALSE
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
EX_Hook::CreateProcessA ApplicationName=%s
EX_Hook::CreateProcessA CommandLine=%s
EX_Hook::CreateProcessA lCurrentDirectory=%s
EX_Hook::CreateProcessA Module:%s
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
WWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWW
EX_Hook::CreateProcessW ApplicationName=%ws
EX_Hook::CreateProcessW CommandLine=%ws
EX_Hook::CreateProcessW lCurrentDirectory=%ws
EX_Hook::CreateProcessW Module:%s
WWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWW
%SystemRoot%\System32\
***ERROR::CSplicing::Hook not found bytes 0x55 0x90 0xE9
InjectDllFromMemory
```

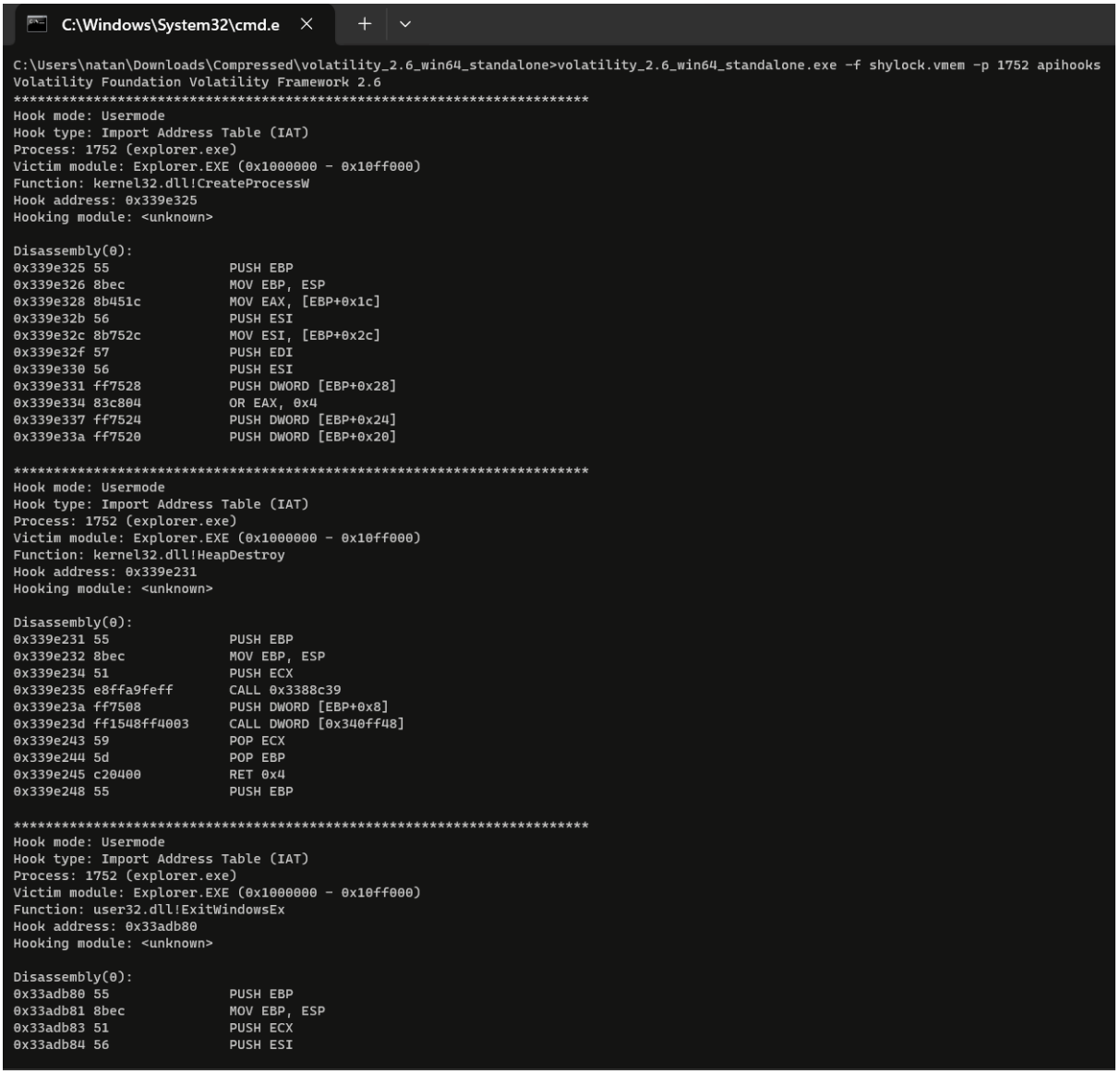
```
FF_READ4 exit
FF::PR_ReadHook entry
FF::ReqIsRequest FOUND fd=%08X m_isBotInfo=%d m_isInject=%d m_isContentTextXml=%d
FF::ReqIsRequest IS NATIVE = FALSE
FF::ReqIsRequest IS NATIVE = TRUE
FF::ReqIsRequest = FALSE
FF::PR_Read (native) fd=%08X amount=%d read=%d
DATA——
```

```
2003 NSPR4.DLL not found Inst.strNSPR4=%s
2004 |$$$}rstuvwxyz{$$$$$$$>?@ABCDEFGHIJKLMNOPQRSTUVW$$$$$$XYZ[\]^_`abcdefghijklmnopq
2005 IE_Hook::GetReplayInfo entry
2006 DIE_Hook::GetReplayInfo exit
2007 IE::Config=%s
2008 EMPTY
2009 IE::ReqFindRequest FOUND hOpenRequest=%08X m_hRequestFake=%d m_isBotInfo=%d m_isInject=%d m_isContentTextXml=%d
2010 IE::InternetReadFile (NATIVE) hOpenRequest=%08X size=%d
2011 IE::InternetReadFile (NATIVE) hOpenRequest=%08X size=%d domain=%s request=%s%s
2012 IE::InternetReadFileExA (NATIVE) hOpenRequest=%08X
2013 IE::InternetReadFileExA (NATIVE) hOpenRequest=%08X domain=%s request=%s%s
2014 IE::InternetReadFileExW (NATIVE) hOpenRequest=%08X
2015 IE::InternetReadFileExW (NATIVE) hOpenRequest=%08X domain=%s request=%s%s
2016 IE::InternetReadFile1() hOpenRequest=%08X domain=%s request=%s%s
2017 ERROR_IO_PENDING hOpenRequest=%08X timeout=%d
2018 ***ERROR::InternetQueryDataAvailable() GetLastError()=%d hOpenRequest=%08X dwSize=%d timeout=%d
2019 domain=%s request=%s%s
```

Screenshot di atas dari hasil analisa String memory dump yang menunjukkan adanya inject dan juga hooking ke suatu server

```
VAD node @ 0x81805108 Start 0x032c0000 End 0x032fffff Tag VadS
Flags: CommitCharge: 15, PrivateMemory: 1, Protection: 4
Protection: PAGE_READWRITE

VAD node @ 0x81623e58 Start 0x03380000 End 0x03416fff Tag VadS
Flags: CommitCharge: 151, MemCommit: 1, PrivateMemory: 1, Protection: 6
Protection: PAGE_EXECUTE_READWRITE

VAD node @ 0x817ad558 Start 0x03880000 End 0x038bffff Tag VadS
Flags: CommitCharge: 15, PrivateMemory: 1, Protection: 4
Protection: PAGE_READWRITE

VAD node @ 0x8150c728 Start 0x036e0000 End 0x03776fff Tag VadS
Flags: CommitCharge: 151, MemCommit: 1, PrivateMemory: 1, Protection: 6
Protection: PAGE_EXECUTE_READWRITE

VAD node @ 0x81780420 Start 0x03560000 End 0x035f1fff Tag VadS
Flags: CommitCharge: 146, MemCommit: 1, PrivateMemory: 1, Protection: 4
Protection: PAGE_READWRITE
```

Terdapat dua memory protection yang PAGE_EXECUTE_READWRITE yang mengindikasikan merupakan hosts dari malicious codenya



apihooks

apihooks merupakan volatility plugin yang digunakan untuk mendeteksi API hooks pada process dan kernel memory.

terlihat bahwa explorer.exe menggunakan kernel32.dll dan function seperti CreateProcess, HeapDestroy, ExitWindows, dan masih banyak lainnya yang seharusnya untuk explorer.exe tidak menggunakan function tersebut yang artinya bahwa benar explorer.exe adalah malwarenya.

```
C:\Users\natan\Downloads\Compressed\volatility_2.6_win64_standalone>volatility_2.6_win64_standalone.exe -f shylock.vmem --pid 1752 dlldump -D ./
Volatility Foundation Volatility Framework 2.6
Process(V) Name                 Module Base Module Name          Result
---------- -------------------- ----------- -------------------- ------
0x818f5cd0 explorer.exe         0x001000000 Explorer.EXE         OK: module.1752.1af5cd0.1000000.dll
0x818f5cd0 explorer.exe         0x07c900000 ntdll.dll            OK: module.1752.1af5cd0.7c900000.dll
0x818f5cd0 explorer.exe         0x07c340000 MSVCR71.dll          OK: module.1752.1af5cd0.7c340000.dll
0x818f5cd0 explorer.exe         0x078130000 urlmon.dll           OK: module.1752.1af5cd0.78130000.dll
0x818f5cd0 explorer.exe         0x077f60000 SHLWAPI.dll          OK: module.1752.1af5cd0.77f60000.dll
0x818f5cd0 explorer.exe         0x03dfd0000 iertutil.dll         OK: module.1752.1af5cd0.3dfd0000.dll
0x818f5cd0 explorer.exe         0x0767a0000 NTDSAPI.dll          OK: module.1752.1af5cd0.767a0000.dll
0x818f5cd0 explorer.exe         0x077fe0000 Secur32.dll          OK: module.1752.1af5cd0.77fe0000.dll
0x818f5cd0 explorer.exe         0x0755f0000 netcfgx.dll          OK: module.1752.1af5cd0.755f0000.dll
0x818f5cd0 explorer.exe         0x077c00000 VERSION.dll          OK: module.1752.1af5cd0.77c00000.dll
0x818f5cd0 explorer.exe         0x05f800000 MpOAv.dll            OK: module.1752.1af5cd0.5f800000.dll
0x818f5cd0 explorer.exe         0x071a50000 mswsock.dll          OK: module.1752.1af5cd0.71a50000.dll
0x818f5cd0 explorer.exe         0x071c80000 NETRAP.dll           OK: module.1752.1af5cd0.71c80000.dll
0x818f5cd0 explorer.exe         0x07e290000 SHDOCVW.dll          OK: module.1752.1af5cd0.7e290000.dll
0x818f5cd0 explorer.exe         0x076eb0000 TAPI32.dll           OK: module.1752.1af5cd0.76eb0000.dll
0x818f5cd0 explorer.exe         0x074ad0000 POWRPROF.dll         OK: module.1752.1af5cd0.74ad0000.dll
0x818f5cd0 explorer.exe         0x075290000 wbemcomn.dll         OK: module.1752.1af5cd0.75290000.dll
0x818f5cd0 explorer.exe         0x077920000 SETUPAPI.dll         OK: module.1752.1af5cd0.77920000.dll
0x818f5cd0 explorer.exe         0x071c90000 NETUI1.dll           OK: module.1752.1af5cd0.71c90000.dll
0x818f5cd0 explorer.exe         0x071b20000 MPR.dll              OK: module.1752.1af5cd0.71b20000.dll
0x818f5cd0 explorer.exe         0x076390000 IMM32.DLL            OK: module.1752.1af5cd0.76390000.dll
0x818f5cd0 explorer.exe         0x077c10000 msvcrt.dll           OK: module.1752.1af5cd0.77c10000.dll
0x818f5cd0 explorer.exe         0x0755c0000 msctfime.ime         OK: module.1752.1af5cd0.755c0000.dll
0x818f5cd0 explorer.exe         0x0767f0000 schannel.dll         OK: module.1752.1af5cd0.767f0000.dll
0x818f5cd0 explorer.exe         0x07e410000 USER32.dll           OK: module.1752.1af5cd0.7e410000.dll
0x818f5cd0 explorer.exe         0x001210000 xpsp2res.dll         OK: module.1752.1af5cd0.1210000.dll
0x818f5cd0 explorer.exe         0x077a20000 cscui.dll            OK: module.1752.1af5cd0.77a20000.dll
0x818f5cd0 explorer.exe         0x073030000 WZCSAPI.DLL          OK: module.1752.1af5cd0.73030000.dll
0x818f5cd0 explorer.exe         0x076e80000 rtutils.dll          OK: module.1752.1af5cd0.76e80000.dll
0x818f5cd0 explorer.exe         0x073380000 zipfldr.dll          OK: module.1752.1af5cd0.73380000.dll
0x818f5cd0 explorer.exe         0x05dcd0000 eappprxy.dll         OK: module.1752.1af5cd0.5dcd0000.dll
0x818f5cd0 explorer.exe         0x001720000 vmhgfs.dll           OK: module.1752.1af5cd0.1720000.dll
0x818f5cd0 explorer.exe         0x076b20000 ATL.DLL              OK: module.1752.1af5cd0.76b20000.dll
0x818f5cd0 explorer.exe         0x076360000 WINSTA.dll           OK: module.1752.1af5cd0.76360000.dll
0x818f5cd0 explorer.exe         0x075f80000 BROWSEUI.dll         OK: module.1752.1af5cd0.75f80000.dll
0x818f5cd0 explorer.exe         0x05df10000 wzcdlg.dll           OK: module.1752.1af5cd0.5df10000.dll
0x818f5cd0 explorer.exe         0x010000000 DropboxExt.13.dll    OK: module.1752.1af5cd0.10000000.dll
0x818f5cd0 explorer.exe         0x0722b0000 sensapi.dll          OK: module.1752.1af5cd0.722b0000.dll
0x818f5cd0 explorer.exe         0x07c3a0000 MSVCP71.dll          OK: module.1752.1af5cd0.7c3a0000.dll
0x818f5cd0 explorer.exe         0x059a60000 dbghelp.dll          OK: module.1752.1af5cd0.59a60000.dll
0x818f5cd0 explorer.exe         0x076080000 MSVCP60.dll          OK: module.1752.1af5cd0.76080000.dll
0x818f5cd0 explorer.exe         0x077690000 NTMARTA.DLL          OK: module.1752.1af5cd0.77690000.dll
0x818f5cd0 explorer.exe         0x05dca0000 OneX.DLL             OK: module.1752.1af5cd0.5dca0000.dll
0x818f5cd0 explorer.exe         0x0662b0000 hnetcfg.dll          OK: module.1752.1af5cd0.662b0000.dll
0x818f5cd0 explorer.exe         0x0478c0000 dot3api.dll          OK: module.1752.1af5cd0.478c0000.dll
0x818f5cd0 explorer.exe         0x074ed0000 wbemsvc.dll          OK: module.1752.1af5cd0.74ed0000.dll
```