IMT4116_S17 Exam

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Basic Static Analysis

a.

The IoC's are:

- 50/61 detection ratio on VirusTotal with names mostly including Trojan.
- Contains executable paths
  - `http://qrojectonline.ath.cx/yourserver.exe`
  - `http://qrojectonline.ath.cx/yourserver2.exe`
- Contains following suspicious API calls
  - InternetReadFile
  - WinExec
- Contains old browser type, probably for internet traffic
  - /Mozilla/4.0 (compatible; MSIE 5.0; Windows 98)

The hypothesis is that this is a trojan that downloads yourserver.exe or yourserver2.exe to install a backdoor, i.e. server on the victim machine.

b.

The IoC's are:

- 56/62 detection rate on VirusTotal with names mostly including Trojan and Backdoor.
- A comment by PayloadSecurity on VirusTotal links to a report[1] with a risk assessment indicating the abilities of remote access, persistence, host fingerprinting. It connects to irc.mcs.net or 104.199.126.136. It also informs of unusually high entropy sections, monitoring of registry changes and creation of auto-execution registry entries.

[1] https://www.hybrid-analysis.com/sample/9de606047ae141a872a7ddb78782fc8a8da5518e879b2239ec931560b7983ba8?environmentId=100

- Finding of *SOFTWARE\MICROSOFT\WINDOWS\CurrentVersion\Run* in strings, indicating supporting persistence mechanism.

Hypothesis is then that it is a trojan backdoor.

c.

- The sample is listed on VirusTotal with 32/59 detection rating with names mostly including Trojan and Backdoor.
- UPX packer was detected on VirusTotal, which is also apparent from two section names UPX0, UPX1 and UPX3.
- urlmon.URLDownloadToFile and SHELL32.ShellExecuteA indicate a download and execution of a file.
- IRC commands among the strings.

With the aforementioned clues, I hypothesize this to be a dropper, utilizing IRC.

Basic Dynamic Analysis

a.

There is a persistence mechanism for the file is put into the registry as shown below. With Procmon and CaptureBAT, I didn't see any network activity or creation of files or other value setting registry operations.

Time of Day	Process Name	PID	Operation	Path	Result	Detail
8:06:25.7569654 PM	exam_2a.exe	2764	RegCreateKey	HKCU\Software\Microsoft\Windows\CurrentVersion\Run	SUCCESS	Desired Access: Set Value, Disposition: REG_OPENED_EXISTING_KEY
8:06:25.7570060 PM	exam_2a.exe	2764	RegSetValue	HKCU\Software\Microsoft\Windows\CurrentVersion\Run\(Default)	SUCCESS	Type: REG_SZ, Length: 78, Data: C:\Users\rev_eng\Downloads\exam_2a.exe

Also it tries to contact the IP address `104.229.85.209` as shown below by fakedns. It was also shown in Process Hacker 2.

```
Respuesta: www.download.windowsupdate.com. -> 192.168.56.103
Respuesta: teredo.ipv6.microsoft.com. -> 192.168.56.103
Respuesta: 104.229.85.209.in-addr.arpa. -> 192.168.56.103
jRespuesta: teredo.ipv6.microsoft.com. -> 192.168.56.103
```

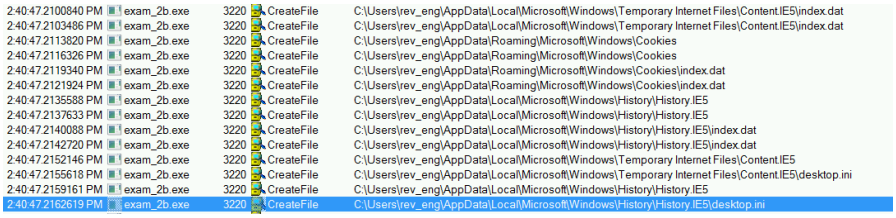
I hypothesize that this is some backdoor.

b.

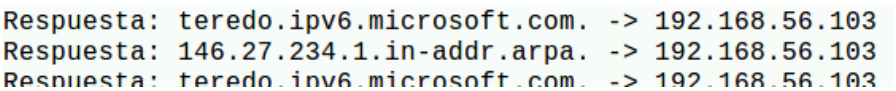
Justing from the Procmon logs, the file activity shows accesses to browser history and cookies as well as access to "cryptbase.dll" and performance of network activity, i.e. contacting `146.27.234.1` as shown with fakedns below (also seen in Process Hacker 2). The process did not stay very long in

execution. My first hypothesis is that it is a cookie and browsing history stealer. The supporting Procmon log parts are shown below.

2:40:47.3525024 PM	exam_2b.exe	3220	UDP Send	WIN-MVG8VI3FP36:52981 -> WIN-MVG8VI3FP36:52981	SUCCESS	Length: 1, seqnum: 0, connid: 0
2:40:47.3525471 PM	exam_2b.exe	3220	UDP Receive	WIN-MVG8VI3FP36:52981 -> WIN-MVG8VI3FP36:52981	SUCCESS	Length: 1, seqnum: 0, connid: 0



2:40:47.2100840 PM	exam_2b.exe	3220	CreateFile	C:\Users\rev_eng\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\index.dat
2:40:47.2103486 PM	exam_2b.exe	3220	CreateFile	C:\Users\rev_eng\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\index.dat
2:40:47.2113820 PM	exam_2b.exe	3220	CreateFile	C:\Users\rev_eng\AppData\Roaming\Microsoft\Windows\Cookies
2:40:47.2116326 PM	exam_2b.exe	3220	CreateFile	C:\Users\rev_eng\AppData\Roaming\Microsoft\Windows\Cookies
2:40:47.2119340 PM	exam_2b.exe	3220	CreateFile	C:\Users\rev_eng\AppData\Roaming\Microsoft\Windows\Cookies\index.dat
2:40:47.2121924 PM	exam_2b.exe	3220	CreateFile	C:\Users\rev_eng\AppData\Roaming\Microsoft\Windows\Cookies\index.dat
2:40:47.2135588 PM	exam_2b.exe	3220	CreateFile	C:\Users\rev_eng\AppData\Local\Microsoft\Windows\History\History.IE5
2:40:47.2137633 PM	exam_2b.exe	3220	CreateFile	C:\Users\rev_eng\AppData\Local\Microsoft\Windows\History\History.IE5
2:40:47.2140088 PM	exam_2b.exe	3220	CreateFile	C:\Users\rev_eng\AppData\Local\Microsoft\Windows\History\History.IE5\index.dat
2:40:47.2142720 PM	exam_2b.exe	3220	CreateFile	C:\Users\rev_eng\AppData\Local\Microsoft\Windows\History\History.IE5\index.dat
2:40:47.2152146 PM	exam_2b.exe	3220	CreateFile	C:\Users\rev_eng\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5
2:40:47.2155618 PM	exam_2b.exe	3220	CreateFile	C:\Users\rev_eng\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\desktop.ini
2:40:47.2159161 PM	exam_2b.exe	3220	CreateFile	C:\Users\rev_eng\AppData\Local\Microsoft\Windows\History\History.IE5
2:40:47.2162619 PM	exam_2b.exe	3220	CreateFile	C:\Users\rev_eng\AppData\Local\Microsoft\Windows\History\History.IE5\desktop.ini



```
Respuesta: teredo.ipv6.microsoft.com. -> 192.168.56.103
Respuesta: 146.27.234.1.in-addr.arpa. -> 192.168.56.103
Respuesta: teredo.ipv6.microsoft.com. -> 192.168.56.103
```

Advanced Analysis

a. Basic Functionality

i.

8, seen via number of dotted arrows in the assembly listing.

ii.

It jumps on condition of the `eax` register not being 0, as determined by The Zero Flag which is set by the previous `dec` instruction if `eax` is 0 after the decrement.

iii.

It jumps on condition of the `esi` register being less than or equal to `0x100` or 256.

iv.

It jumps if the Zero Flag is set by the previous **cmp** instruction. Therefore it jumps if **[ebp + var_9]** is equal to 0. **[ebp + var_9]** is some local variable of the containing function at byte offset **ebp - 9**.

b.

i.

Checking the imports with rabin2, we see the functions **GetKeyState** and **GetAsyncKeyState** which check for the key state according to their documentation:

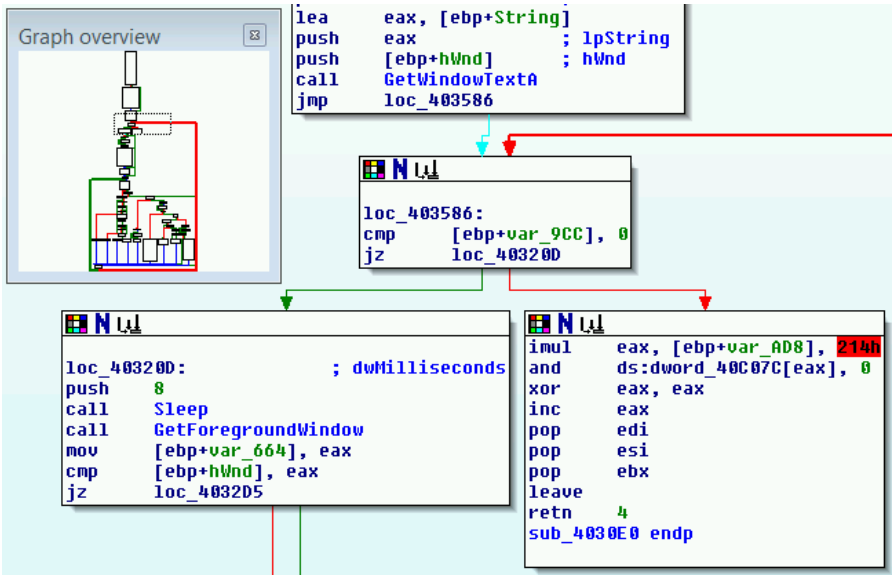
```
(~/exam)
⧗ rabin2 -i exam_3b.exe | grep Key
Warning: check (Var szKey)
Warning: bad parsing Var
Warning: bad parsing (VS_VERSIONINFO VarFileInfo)
ordinal=003 plt=0x00414428 bind=NONE type=FUNC name=USER32.DLL_GetKeyState
ordinal=004 plt=0x0041442c bind=NONE type=FUNC name=USER32.DLL_GetAsyncKeyState
ordinal=005 plt=0x00414430 bind=NONE type=FUNC name=USER32.DLL_MapVirtualKeyA
ordinal=002 plt=0x00414450 bind=NONE type=FUNC name=ADVAPI32.DLL_RegCreateKeyA
ordinal=003 plt=0x00414454 bind=NONE type=FUNC name=ADVAPI32.DLL_RegCreateKeyExA
ordinal=004 plt=0x00414458 bind=NONE type=FUNC name=ADVAPI32.DLL_RegCloseKey
ordinal=005 plt=0x0041445c bind=NONE type=FUNC name=ADVAPI32.DLL_RegOpenKeyA
```

Checking the cross-references or calls to those functions with radare2, we obtain the addresses `0x4032db`, `0x403306`, `0x403332` and `0x4032f3`:

```
[0x004011cb]> aaa
[x] Analyze all flags starting with sym. and entry0 (aa)
[x] Analyze len bytes of instructions for references (aar)
[x] Analyze function calls (aac)
[ ] [*] Use -AA or aaaa to perform additional experimental analysis.
[x] Constructing a function name for fcn.* and sym.func.* functions (aan))
[0x004011cb]> axt sub.USER32.DLL_GetKeyState_d98
call 0x4032db call sub.USER32.DLL_GetKeyState_d98 in unknown function
call 0x403306 call sub.USER32.DLL_GetKeyState_d98 in unknown function
call 0x403332 call sub.USER32.DLL_GetKeyState_d98 in unknown function
[0x004011cb]> axt sub.USER32.DLL_GetAsyncKeyState_da4
call 0x4032f3 call sub.USER32.DLL_GetAsyncKeyState_da4 in unknown function
[0x004011cb]>
```

ii.

As is shown in the graph overview in the image below, there is one big loop in which the calls to **GetKeyState** and **GetAsyncKeyState** are called. Furthermore, the image shows the first basic block that enters the loop (the top box) and the last basic block of the loop (the middle box) that conditionally exits the loop. The beginning of the loop or the address of the jump into it is `0x00403208` and the end or the address of the jump out of the loop is `0x0040358D`.



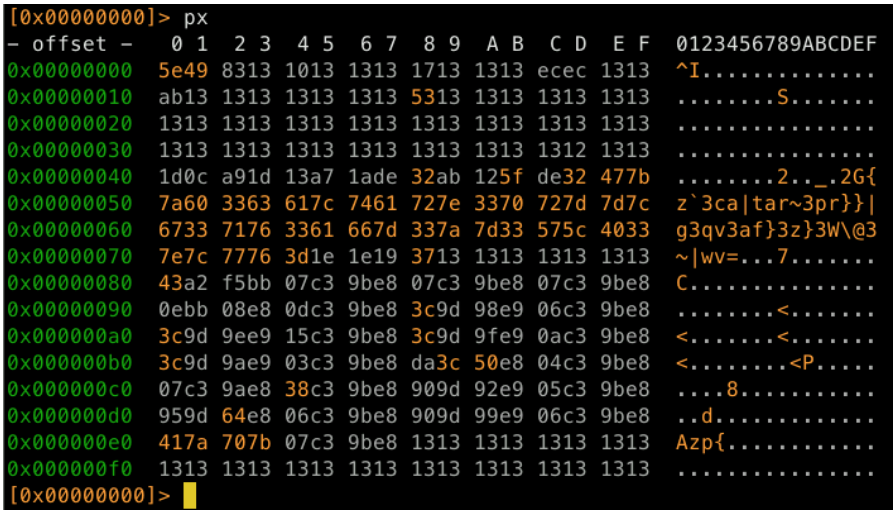
iii.

The number is located in variable *[ebp + var_9CC]* in the containing polling function. The variable is obtained from a 4096 byte array which is read from 0x412e10 in the .data section to *[ebp + var_408]*. The dword which is consequently written into *[ebp + var_9CC]* lies at address 0x41284C + (0x9cc - 0x408) = 0x412e10. Further analysis is needed to determine this value.

c.

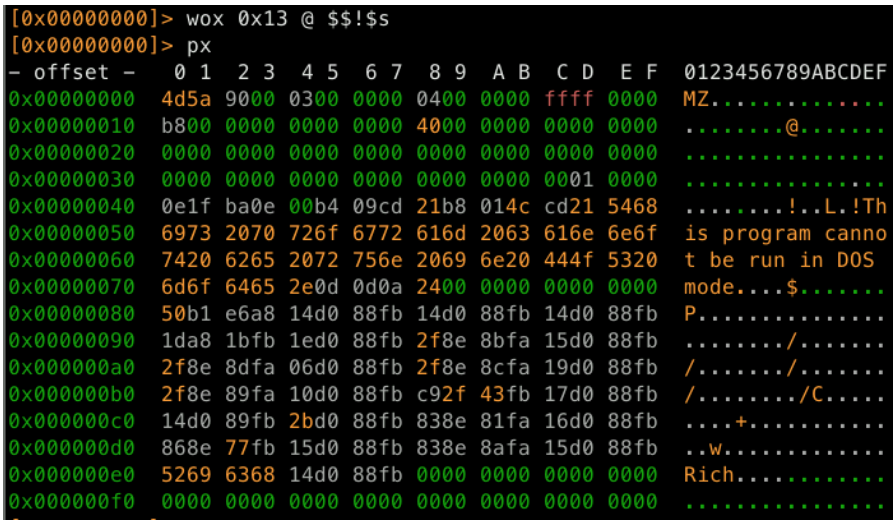
i.

Checking the hex dump as shown below, reveals a high prevalence of 0x13 bytes and unusually few 0x0 bytes. This makes single byte XOR encoding seem likely since in that case all 0x0 bytes transform to the single byte key as value.



ii.

Trying 0x13 as a single byte XOR key on the whole file reveals proper PE executable format as shown below, revealing it to indeed be the key. The meaning of the decoding command is to XOR 0x13 at (@) current location ($$), which is the first byte of the file, and throughout the byte length of the file ($s).

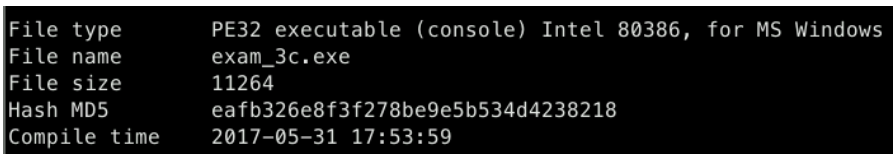


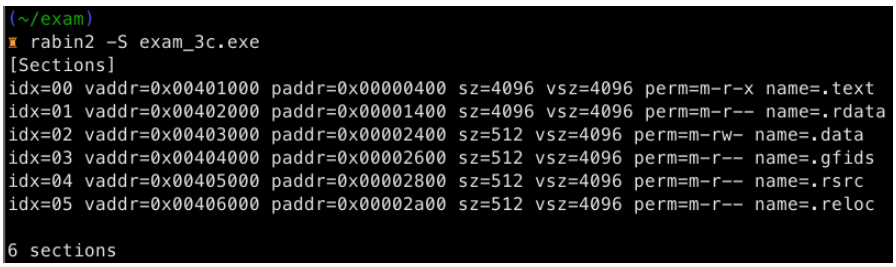
iii.

The file was decoded as seen in the image above.

iv.

The screenshots below show this information. The first one is from the peframe tool and the second one from rabin2 revealing the section names.





d.

i.

The string size being a multiple of 4 with no "=" at the end and being alphanumeric points to it being a base64 encoding, which it is (see ii.).

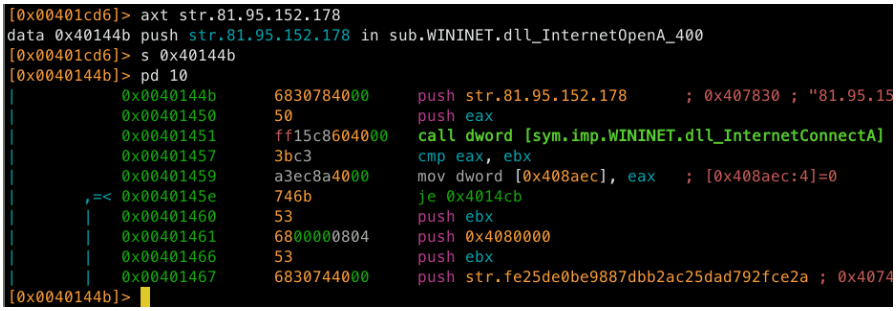
ii.

The decoding is shown in the image below.

e.

i.

Trying to run the sample for network capture didn't work, seeing as I didn't capture any traffic running it. So I contend with static analysis. By running strings, we find one IP address `81.95.152.178`. To see whether it is indeed used to connect, we can see the network function (InternetConnectA) taking it as argument as shown below in the function referencing the string.

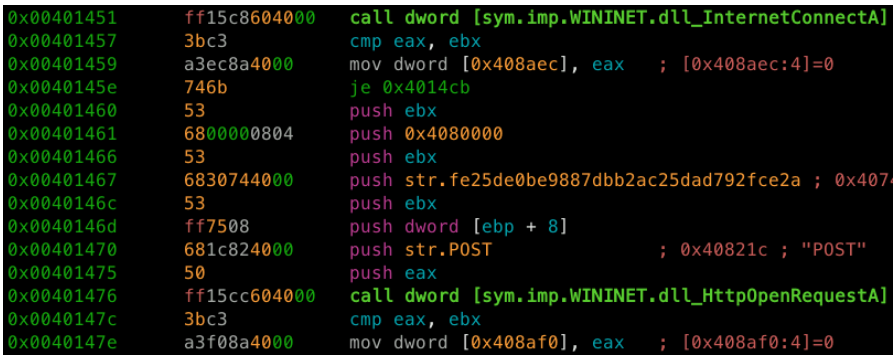


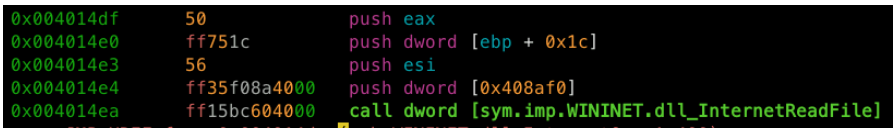
ii.

The HTTP protocol is used as evidenced below.

iii.

After using the IP in establishing connection as explained in (i.), the same function then creates an HTTP request handle using that connection as shown below. The connection handle is carried in `eax` and passed to the HTTPOpenRequestA API call at address `0x00401476` which creates the read handle. The read handle is stored in `0x408af0` and is then later passed to InternetReadFile API call at address `0x004014ea` which reads the returned data.





iv.

Running strings on the executable, we see 6 strings that look like promising command candidates: wait, execute, icmp_flood, http_flood, download and sysinfo. Upon further inspection of the function

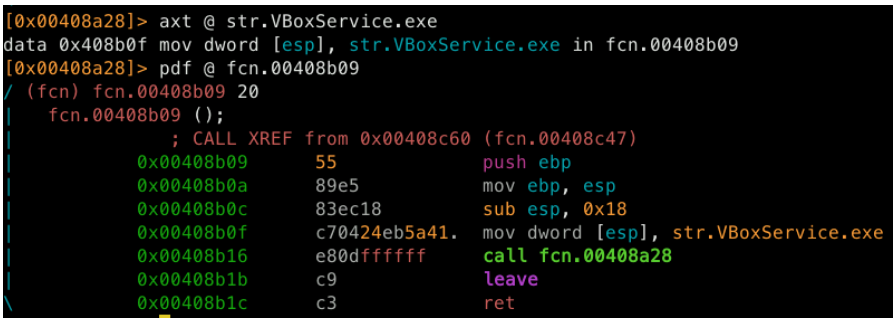
cross referencing the sysinfo string, they seem very likely to be commands indeed. I give only the summary of the function below, showing its strings and calls. The candidate commands are passed as strings to the function fcn.00401b20. The return value prompts a jump past the other calls, indicating some kind of if-else construct. The command seems to come from the index.php file fetched in the beginning.

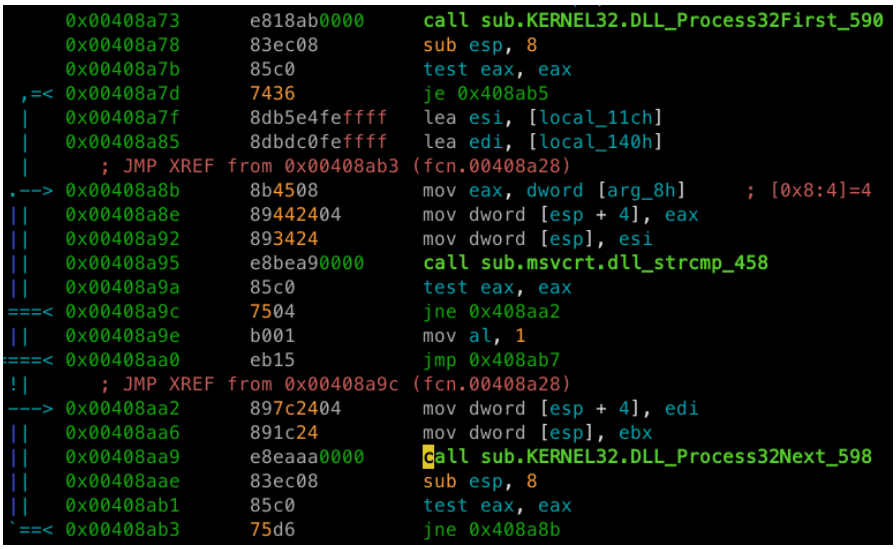
```
[0x0040144b]> axt @ str.sysinfo
data 0x4015cd push str.sysinfo in sub.urlmon.dll_URLDownloadToFileA_57b
[0x0040144b]> pdsf @ sub.urlmon.dll_URLDownloadToFileA_57b
0x00401598 str._index.php
0x0040159d call sub.WININET.dll_InternetOpenA_400
0x004015b6 call fcn.00401c3a
0x004015bc call fcn.00401c2f
0x004015c6 call fcn.00401c3a
0x004015cd str.sysinfo
0x004015d3 call fcn.00401b20
0x004015e2 call sub.KERNEL32.dll_GlobalMemoryStatus_0
0x004015f0 str.download
0x004015f6 call fcn.00401b20
0x00401603 call fcn.00401c3a
0x0040160c call fcn.00401c3a
0x00401616 call fcn.00401188
0x00401620 str.http_flood
0x00401626 call fcn.00401b20
0x00401633 call fcn.00401c3a
0x0040163c call fcn.00401c3a
0x00401642 call fcn.00401c2f
0x0040164c call fcn.00401c3a
0x00401656 call fcn.00401c3a
0x0040165c call fcn.00401c2f
0x00401669 call sub.WININET.dll_InternetOpenA_20d
0x00401676 str.icmp_flood
0x0040167c call fcn.00401b20
0x00401689 call fcn.00401c3a
0x00401692 call fcn.00401c3a
0x00401698 call fcn.00401c2f
0x0040169f call fcn.004012b6
0x004016a9 str.execute
0x004016af call fcn.00401b20
0x004016bc call fcn.00401c3a
0x004016c5 call sub.KERNEL32.dll_CreateProcessA_32d
0x004016d2 str.wait
0x004016d8 call fcn.00401b20
0x004016e5 call fcn.00401c3a
0x004016eb call fcn.00401c2f
0x004016f4 call dword [sym.imp.KERNEL32.dll_Sleep]
0x00401707 call fcn.00401b20
0x00401717 call fcn.00401a40
[0x0040144b]>
```

f.

i.

Running strings on the executable, we see the `VBoxService.exe` string, a hallmark of the Virtualbox guest services (probably in an earlier version as I couldn't verify it in my own VM). On checking where the string is cross referenced, it is passed to a function as seen in the screenshots below. The latter screenshot shows the loop within the function that iterates the list of running processes and compares it to the string. If a match is found, the function returns that result. The address of the check can be said to be the Kernel32.dll strcmp function at address 0x00408a95.





ii.

We see that the function `fcn.00408b09` above is cross referenced from `fcn.00408c47`. Examining that function, we see many other checking functions similar to `fcn.00408b09`. A summary of the

strings and functions in `fcn.00408c47` are shown below. We see the sample additionally checks for the automated analysis tool Joebox, Sandboxie and Wireshark. It additionally tries to crash OllyDbg 1.1 with the OutputDebugString vulnerability. It also tests for any debugger in general with IsDebuggerPresent and a timing attack with GetTickCount. It also checks for the presence of some Window, but I'm not sure what yet.

```
[0x00408c47]> pdfs @ fcn.00408b31
0x00408b38 str.joeboxserver.exe
0x00408b3f call fcn.00408a28
0x00408b46 str.joeboxcontrol.exe
0x00408b4d call fcn.00408a28
0x00408b54 cjmp 0x00408b58
[0x00408c47]> pdfs @ fcn.00408b1d
0x00408b23 str.Wireshark.exe
0x00408b2a call fcn.00408a28
[0x00408c47]> pdfs @ fcn.00408b09
0x00408b0f str.VBoxService.exe
0x00408b16 call fcn.00408a28
[0x00408c47]> pdfs @ fcn.00408abf
0x00408ac6 str.SbieDll.dll
0x00408acd call sub.KERNEL32.DLL_GetModuleHandleA_4d8
0x00408ad7 str.SandboxieRpcSs.exe
0x00408ade call fcn.00408a28
0x00408ae5 cjmp 0x00408aeb
0x00408ae9 jmp 0x00408af0
0x00408aeb:
0x00408af0:
0x00408af0 str.SandboxieDcomLaunch.exe
0x00408af7 call fcn.00408a28
[0x00408c47]> pdfs @ fcn.00408ba2
0x00408ba8 str._s_s_s_s_s_s_s_s_s_s_s_s_s_s_s_s_s_s_s_s_s_s_
0x00408baf call sub.KERNEL32.DLL_OutputDebugStringA_5a0
[0x00408c47]> pdfs @ fcn.00408b60
0x00408b87 call sub.USER32.dll_FindWindowA_498
0x00408b91 cjmp 0x00408ba0
0x00408b96 call sub.KERNEL32.DLL_CloseHandle_4f8
[0x00408c47]> pdfs @ fcn.00408c16
0x00408c1d call sub.KERNEL32.DLL_GetTickCount_5a8
0x00408c2b call sub.KERNEL32.DLL_Sleep_500
0x00408c33 call sub.KERNEL32.DLL_GetTickCount_5a8
```

iii.

From our findings in (ii.) and examining the function, it is clear the function check for a laboratory environment and returns a boolean true if so, otherwise false.

iv.

From 0x00408cc3 as shown below.

```
[0x00408c47]> axt @ fcn.00408c47
call 0x408cc3 call fcn.00408c47 in unknown function
```

v.

If the laboratory environment is detected, then the malware terminates, otherwise it continues on (for some routine checks before continuing). This is shown below.

```
[0x00408cc3]> pd 15
                ; JMP XREF from 0x00408cf9 (fcn.00408c47 + 178)
        .-> 0x00408cc3      e87fffffff      call fcn.00408c47
        |   0x00408cc8      84c0            test al, al
       ,==< 0x00408cca      7417            je 0x408ce3
       ||   0x00408ccc      c74424040000.   mov dword [esp + 4], 0
       ||   0x00408cd4      c70424ffffff.   mov dword [esp], 0xffffffff ; [0xffffffff:4
       ||   0x00408cdb      e840a80000      call sub.KERNEL32.DLL_TerminateProcess_520
       ||   0x00408ce0      83ec08          sub esp, 8
       |!       ; JMP XREF from 0x00408cca (fcn.00408c47 + 131)
       `--> 0x00408ce3      c70424010000.   mov dword [esp], 1
        |   0x00408cea      e811a80000      call sub.KERNEL32.DLL_Sleep_500
        |   0x00408cef      83ec04          sub esp, 4
        |   0x00408cf2      803d7a9e4100.   cmp byte [0x419e7a], 0
        `=< 0x00408cf9      74c8            je 0x408cc3
                ; JMP XREF from 0x00408cc1 (fcn.00408c47 + 122)
            0x00408cfb      b801000000      mov eax, 1
            0x00408d00      c9              leave
            0x00408d01      c20400          ret 4
```

g.

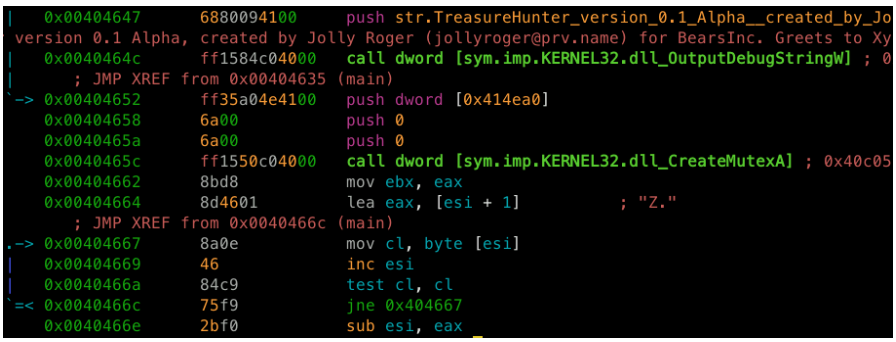
i.

The most likely reason for a mutex is to avoid duplicate instances of the same malware by checking if another mutex with the same name is running before creating a new one.

ii.

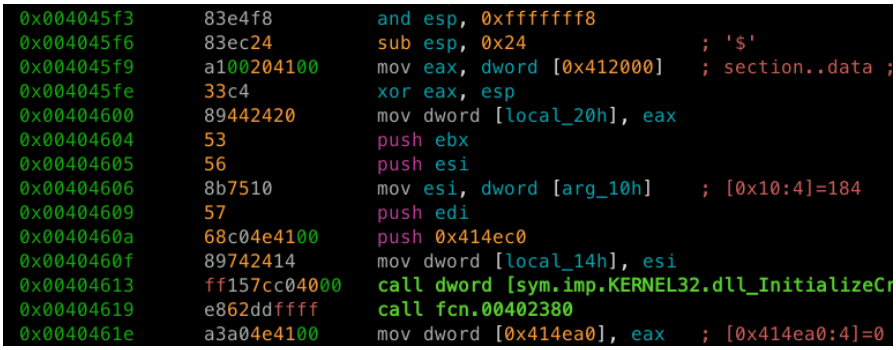
iii.

It is address 0x0040465c as shown below.



iv.

It takes 3 inputs as such `CreateMutexA(0, 0, n)` where `n` is a pointer to the string of the name which in this case is at memory location `0x414ea0` as shown above. These arguments are pushed on the stack from in order of `n` to 0. We see below that the origins of `n` is from a call to the function `fcn.00402380` (which returns a value into `eax` first).



v.

You get it from subroutine `fcn.00402380` as explained in (iv.). I'm not sure yet what to say on its origins.

Combined Analysis

a.

exam_4a.exe is the same as exam_1b.exe, so I refer to the Basic Static Analysis section b regarding exam_4a.exe. exam_4b.exe is an ASCII text file. IoCs regarding exam_4b.exe is the following:

- VirusTotal claims that exam_4b.exe is a part of a larger zip file. Its contents are srvcp.exe (which I believe is the same as exam_1a.exe) and gus.ini. I don't see the hash of gus.ini, but it

is the same size as exam_4b.exe. I'll therefore assume they're the same file as well. Similar to the exam_4a.exe, the larger zip file has a 45/55 detection ratio and is variously named trojan or backdoor.

b.

It tries to set the following registry key below, but without success, perhaps requiring higher privileges.

RegOpenKey	HKLM\SOFTWARE\Microsoft\Windows\CurrentVersion\Run	SUCCESS	Desired Access: All Access
RegSetValue	HKLM\SOFTWARE\Microsoft\Windows\CurrentVersion\Run\Service Profiler	ACCESS DENIED	Type: REG_SZ, Length: 20, Data: srvcp.exe
RegCloseKey	HKLM\SOFTWARE\Microsoft\Windows\CurrentVersion\Run	SUCCESS	

It also tries to read "gus.ini" as shown below.

CreateFile	C:\Windows\System32\gus.ini	NAME NOT FOUND	Desired Access: Generic Read,
CreateFile	C:\Windows\System32\gus.ini	NAME NOT FOUND	Desired Access: Generic Read,
CreateFile	C:\Windows\System32\gus.ini	NAME NOT FOUND	Desired Access: Generic Read,
CreateFile	C:\Windows\System32\gus.ini	NAME NOT FOUND	Desired Access: Generic Read,
CreateFile	C:\Windows\System32\gus.ini	NAME NOT FOUND	Desired Access: Generic Read,
CreateFile	C:\Windows\System32\gus.ini	NAME NOT FOUND	Desired Access: Generic Read,
CreateFile	C:\Windows\System32\gus.ini	NAME NOT FOUND	Desired Access: Generic Read,
CreateFile	C:\Windows\System32\gus.ini	NAME NOT FOUND	Desired Access: Generic Read,

There was some network activity noticed for exam_4a.exe in Process Hacker 2. It tried to connect to an IRC server on port 6667.

c.

Yes, now the sample successfully writes to the same registry key mentioned above.

RegOpenKey	HKLM\SOFTWARE\Microsoft\Windows\CurrentVersion\Run	SUCCESS	Desired Access: All Access
RegSetValue	HKLM\SOFTWARE\Microsoft\Windows\CurrentVersion\Run\Service Profiler	SUCCESS	Type: REG_SZ, Length: 20, Data: srvcp.exe
RegCloseKey	HKLM\SOFTWARE\Microsoft\Windows\CurrentVersion\Run	SUCCESS	

d.

In my dynamic analysis environment, I set up an IRC service in Inetsim and ran Tshark to capture incoming packets. Reading the pcapng file revealed the following. We see the nickname is "mikey" and channel "#daFuck".

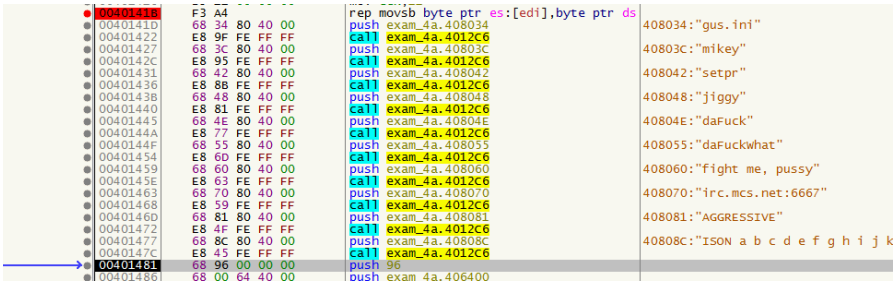
```
Internet Relay Chat
    Request: NICK :mikey
        Command: NICK
        Trailer: mikey
    Request: USER Yp Yp Yp :fight me, pussy
        Command: USER
        Command parameters
            Parameter: Yp
            Parameter: Yp
            Parameter: Yp
        Trailer: fight me, pussy
    Request: JOIN #daFuck
        Command: JOIN
        Command parameters
            Parameter: #daFuck
```

e.

The difference is that it sends traffic now to port 6666 instead of 6667. There is no IRC communication, but just TCP packets are sent. Still the TCP packet contents seem to contain much the same IRC messages as before. It seems to repeat trying to change its nickname, which is already taken. I don't have time to look into that deeper.

f.

Debugging the sample with x64dbg as shown below reveals the function to be a string decoder for various strings. Two of the decoded strings are "gus.ini" and "mikey".



g.

i.

Using radare2, it is revealed to be at address 0x40366a as as is seen in the first line of the last command shown below.

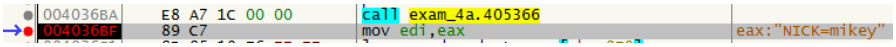
```
[0x004011cb]> f | grep fopen
0x0000a4ce 4 reloc.CRTDLL.DLL_fopen_206
0x0040a290 0 sym.imp.CRTDLL.DLL_fopen
0x0040573c 6 sub.CRTDLL.DLL_fopen_73c
[0x004011cb]> axt @ sub.CRTDLL.DLL_fopen_73c
call 0x40366a call sub.CRTDLL.DLL_fopen_73c in fcn.0040363d
call 0x4038f2 call sub.CRTDLL.DLL_fopen_73c in fcn.004038bb
call 0x4041a5 call sub.CRTDLL.DLL_fopen_73c in fcn.00404195
call 0x404390 call sub.CRTDLL.DLL_fopen_73c in unknown function
[0x004011cb]>
```

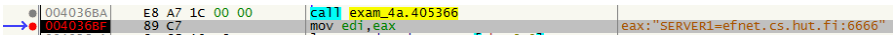
ii.

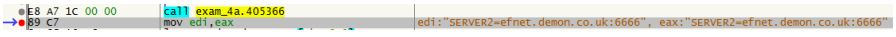
Using radare2, we find the cross references to that function as shown below. I pick the last one at address 0x4036ba since it is in a known function which fopen was also in.

```
[0x004011cb]> axt @ fcn.00405366
call 0x401e7a call fcn.00405366 in unknown function
call 0x401f05 call fcn.00405366 in unknown function
call 0x4036ba call fcn.00405366 in fcn.0040363d
```

Looping over the function in x64dbg as shown below, we see the string eax points to after the call. Call 1, 9 and 10 are the only ones in which a (nonnull) string is returned, shown below in succession.







h.

My findings indicate this malware sample, exam_2a.exe as being a trojan backdoor, likely left behind by a dropper that also left exam_2b.exe behind as it is used by exam_2a.exe which does not drop it on its own. It communicates with the domains irc.mcs.net over port 6667 and efnet.cs.hut.fi and efnet.demon.co.uk over port 6666. Evidence points to possible remote control from these domains, which could be confirmed with more analysis time.

Open Source

a.

WannaCry is malware classified as ransomware. Its purpose is financial gain, to encrypt the contents of victim Windows computers and to demand a ransom in bitcoins in order to have the contents decrypted (usable again)[2].

b.

The malware spreads between infected machines by utilizing a Samba (SMB) vulnerability[3] in Windows machines. SMB is used mainly for file sharing[4] between computers.

c.

You can use an automated reputable WannaCry aware anti-malware solution for detection such as Malwarebytes here. You can also look for indicators matching the file attributes listed here here. If you find such files, you can try to match them to the YARA signature found here. There are some solutions to remove it, such as here.

d.

Follow the recommended steps for protection from the solutions section here.

[2] https://www.us-cert.gov/ncas/alerts/TA17-132A
[3] https://technet.microsoft.com/en-us/library/security/ms17-010.aspx
[4] https://en.wikipedia.org/wiki/Server_Message_Block