Assignment 4 Report

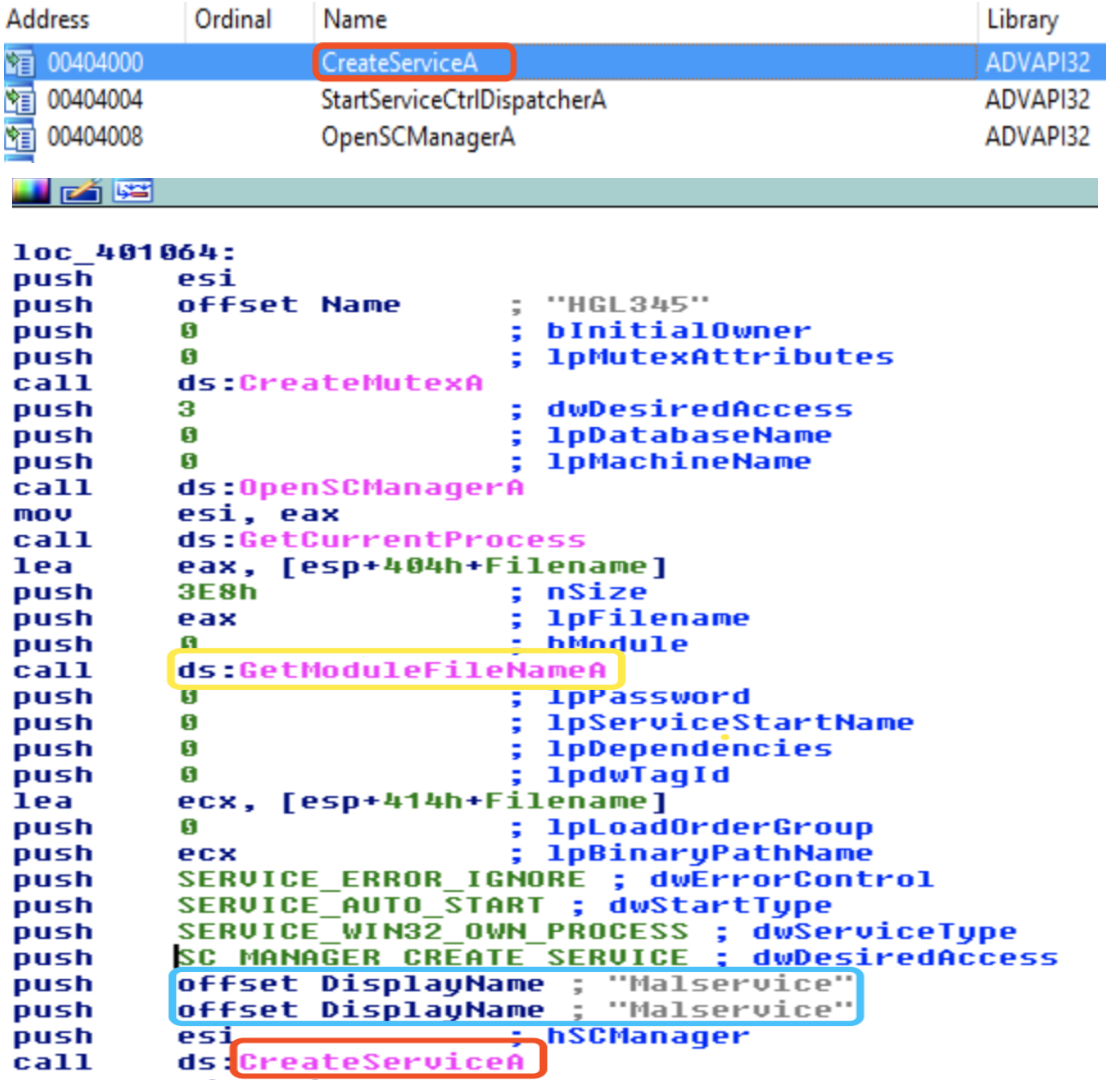
Group Name: Aw, Snap!
Group Members: Weijia Sun, Xinyu Lyu, Mengmei Ye

Lab 7-1

Analyze the malware found in the file Lab07-01.exe.

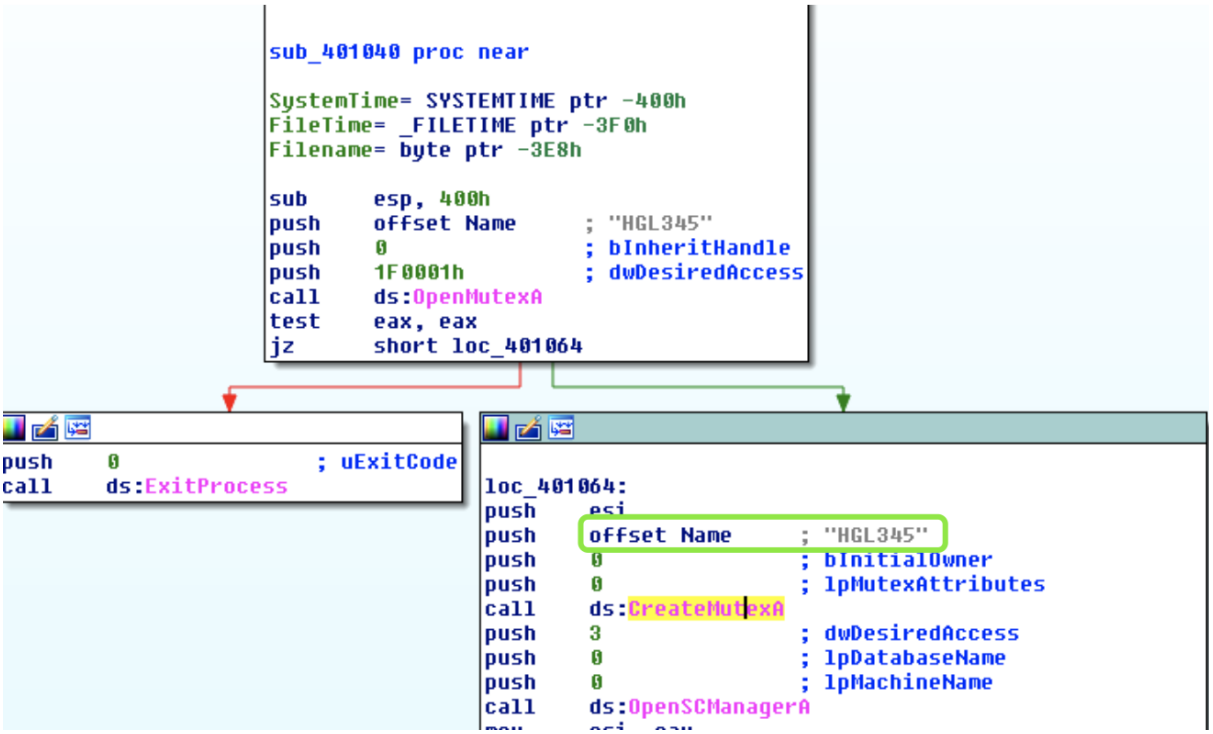
Questions

1. How does this program ensure that it continues running (achieves persistence) when the computer is restarted?



By using IDA Pro, we find that CreateServiceA has been used. With the codes above, we can see it tries to create a function service that it runs its own process and load the windows. Service name is called “Malservice”. And the service will run the executable path from GetModuleFileNameA.

2. Why does this program use a mutex?

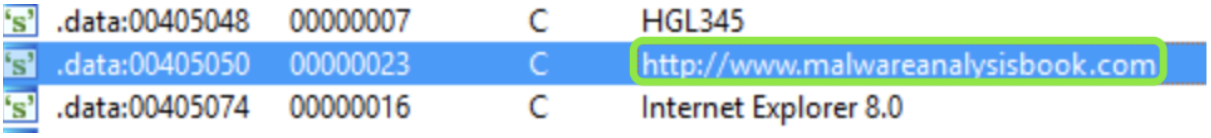


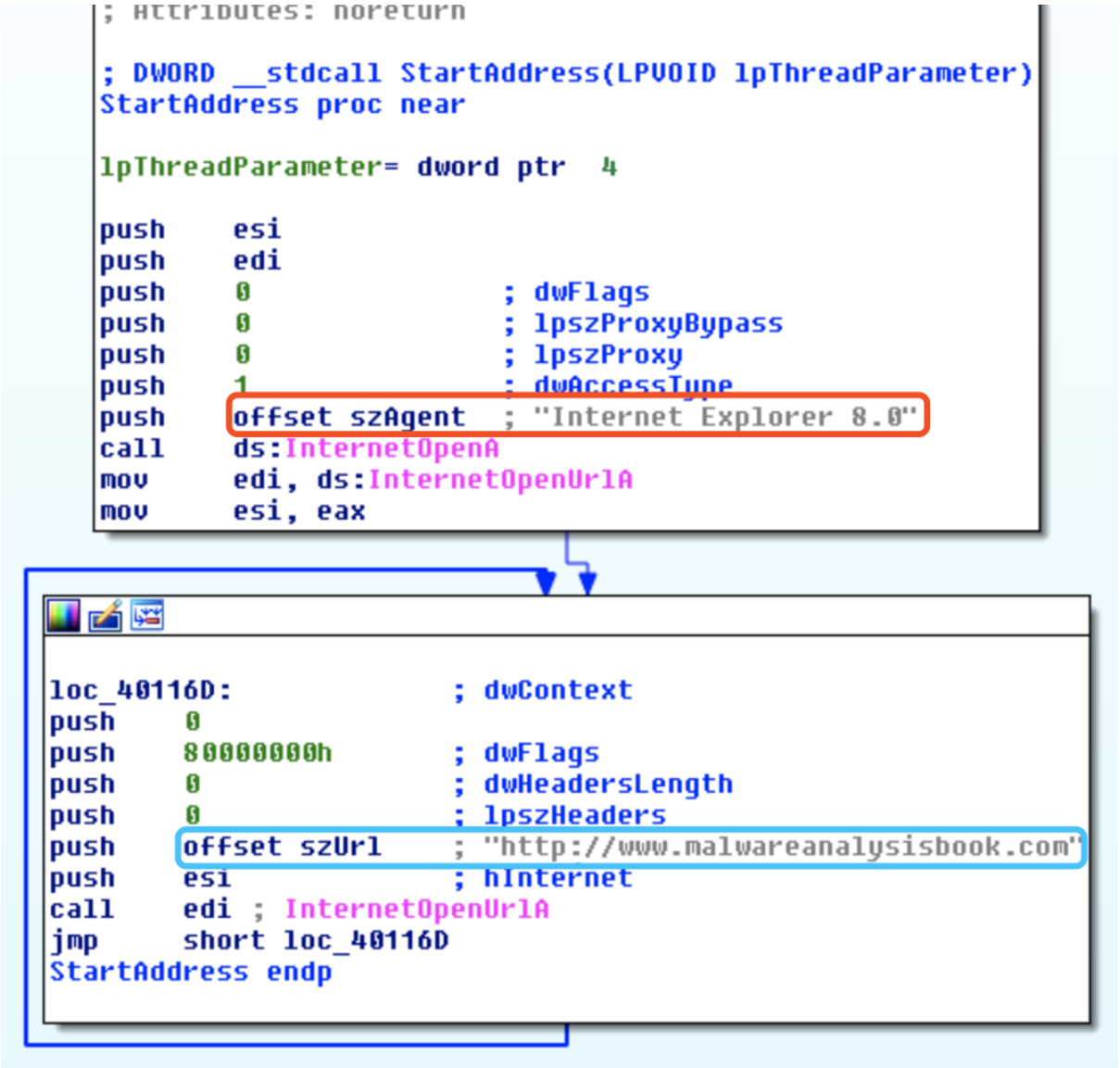
From the figure above, we can see the malware wants to open the mutex called "**HGL345**". And because of the ExitProcess, it is unable to run the program with two instances at the same time, or it will get exits.

3. What is a good host-based signature to use for detecting this program?

Mutex named "**HGL345**" and Service named "**Malservice**" are good host-based siganature used foe detecing this program.

4. What is a good network-based signature for detecting this malware?



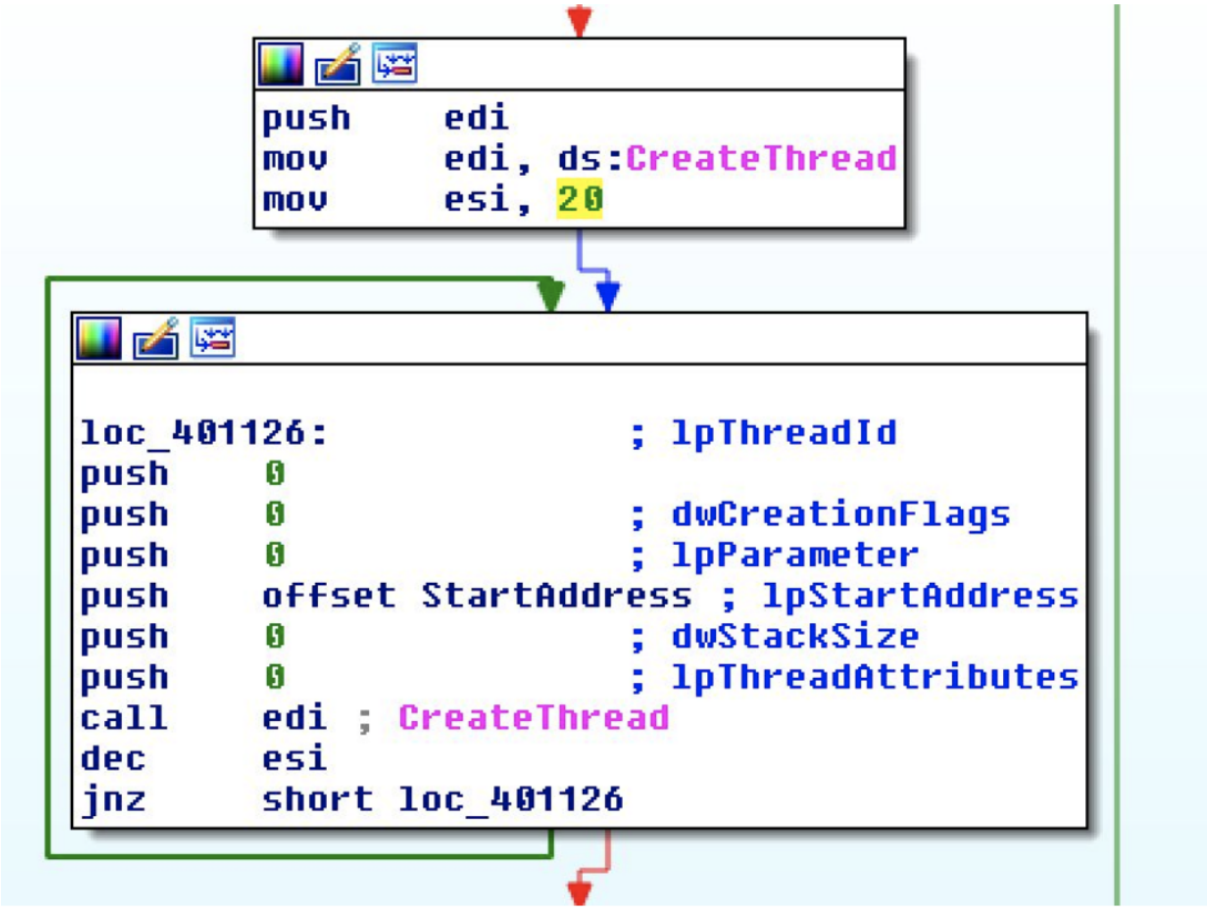


Just by looking at the strings of the binary, we can easily spot a suspicious URL and by cross referencing, we will arrive at figure 5. The malware simply uses "**Internet Explorer 8.0**" as user agent and it attempts to get "http://www.malwareanalysisbook.com" in a loop. We can use this as the network based signature.

From the strings, we can find a URL "http://www.malwareanalysisbook.com". By diving into the codes, we find that the malware uses "Internet Explorer 8.0" as the user agent to looply get the information from the URL. Therefore, based on the network, we can use that as the signature.

5. What is the purpose of this program?

```
push    esi             ; hSCManager
call    ds:CreateServiceA
xor     edx, edx
lea     eax, [esp+404h+FileTime]
mov     dword ptr [esp+404h+SystemTime.wYear], edx
lea     ecx, [esp+404h+SystemTime]
mov     dword ptr [esp+404h+SystemTime.wDayOfWeek], edx
push    eax             ; lpFileTime
mov     dword ptr [esp+408h+SystemTime.wHour], edx
push    ecx             ; lpSystemTime
mov     dword ptr [esp+40Ch+SystemTime.wSecond], edx
mov     [esp+40Ch+SystemTime.wYear], 2100
call    ds:SystemTimeToFileTime
push    0               ; lpTimerName
push    0               ; bManualReset
push    0               ; lpTimerAttributes
call    ds:CreateWaitableTimerA
push    0               ; fResume
push    0               ; lpArgToCompletionRoutine
push    0               ; pfnCompletionRoutine
lea     edx, [esp+410h+FileTime]
mov     esi, eax
```

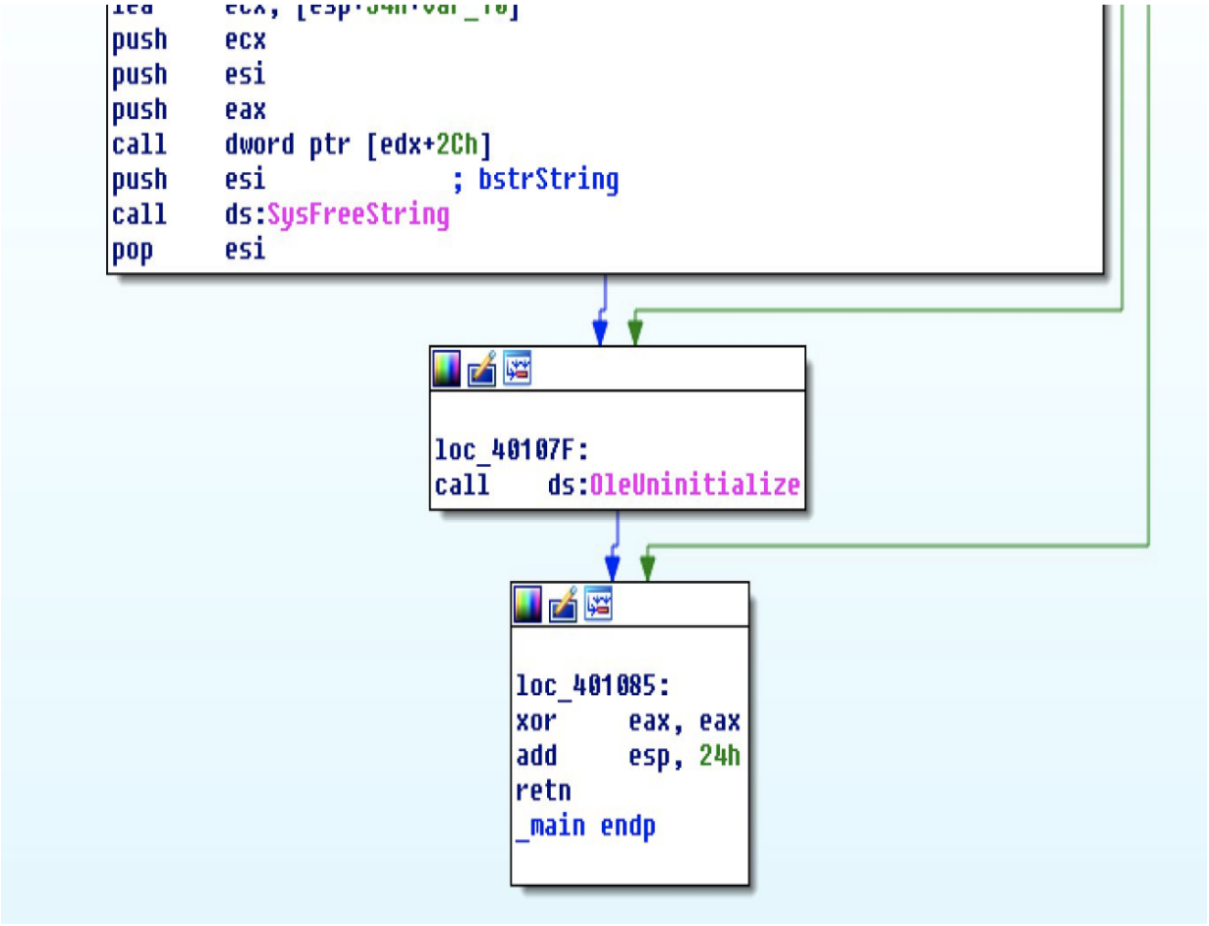


From the figure above, the malware created a WaitableTimer with the system time set as 2100 00:00:00. Therefore, with that infinite timeout WaitableTimer, the program will wait until the year of 2100. Next, it will create 20 threads. To sum up, the malware will wait until 2100 00:00:00 to make Distributed Denial of Service(DDoS) attacks on http://www.malwareanalysisbook.com. And, it will make 20 threads loops of infinite Get request functions to the website.

6. When will this program finish executing?
Until the computer shut down or the process killed.

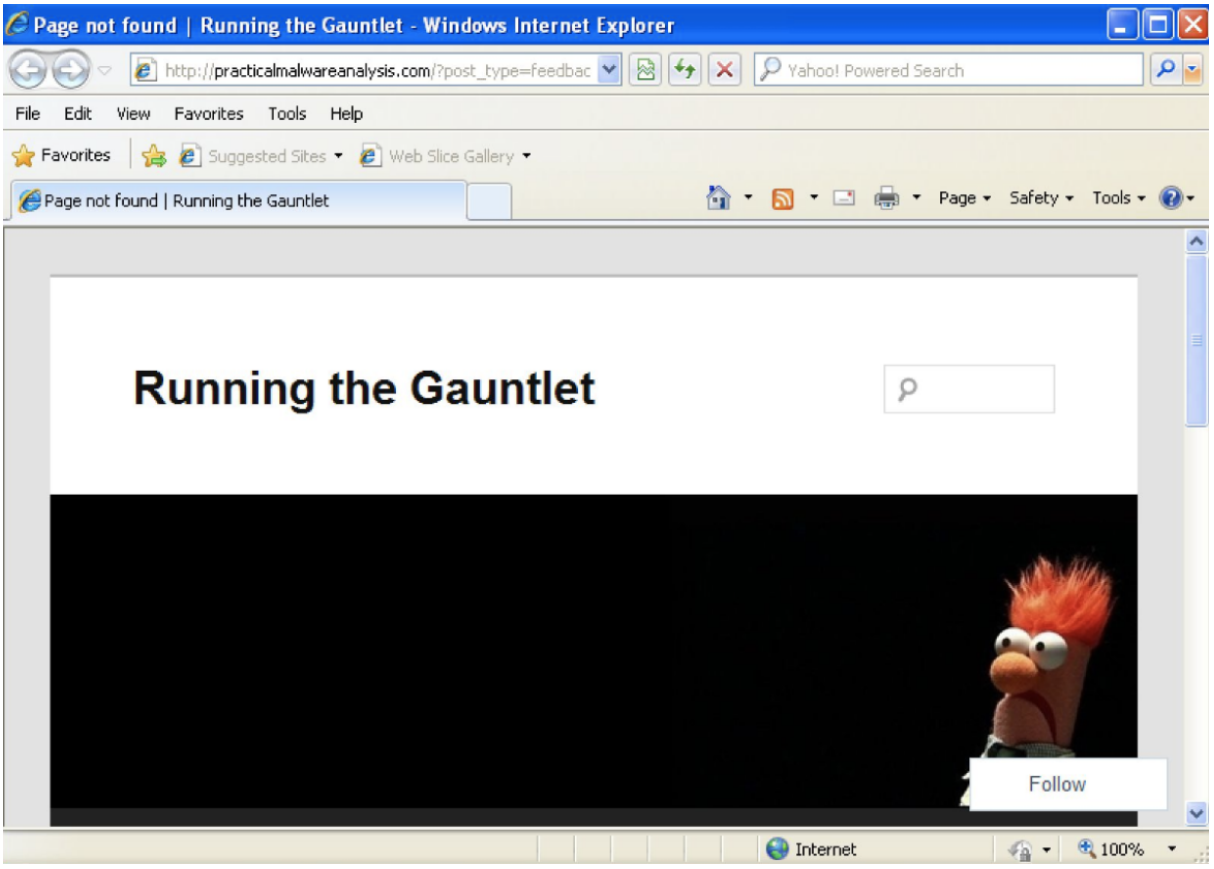
Lab 7-2

Analyze the malware found in the file Lab07-02.exe.
Questions
1. How does this program achieve persistence?



The program finishes popping up a web page. Actually, we don't find any persistence codes in the program.

2. What is the purpose of this program?
The program use the IE Explorer to pop up the ad web page. And the URL is http://www.malwareanalysisbook.com/ad.html.



```
lea     ecx, [esp+24h+pvarg]
push    esi
push    ecx             ; pvarg
call    ds:VariantInit
push    offset psz      ; "http://www.malwareanalysisbook.com/ad.h"...
mov     [esp+2Ch+var_10], 3
mov     [esp+2Ch+var_8], 1
call    ds:SysAllocString
lea     ecx, [esp+28h+pvarg]
mov     esi, eax
```

3. When will this program finish executing?

The program finish when it opening the ad web page (http://www.malwareanalysisbook.com/ad.html.)

Lab 7-3

For this lab, we obtained the malicious executable, Lab07-03.exe, and DLL, Lab07-03.dll, prior to executing. This is important to note because the malware might change once it runs. Both files were found in the same directory on the victim machine. If you run the program, you should ensure that both files are in the same directory on the analysis machine. A visible IP string beginning with 127 (a loopback address) connects to the local machine. (In the real version of this malware, this address connects to a remote machine, but we've set it to connect to localhost to protect you.) WARNING This lab may cause considerable damage to

your computer and may be difficult to remove once installed. Do not run this file without a virtual machine with a snapshot taken prior to execution.

This lab may be a bit more challenging than previous ones. You'll need to use a combination of static and dynamic methods, and focus on the big picture in order to avoid getting bogged down by the details.

Questions

1. How does this program achieve persistence to ensure that it continues running when the computer is restarted?

The program copys Lab07-03.dll to the path "C:\\windows\\system32\\kerne132.dll".

```
mov     edi, ebp
lea     ebx, [esp+ecx+154h+FindFileData.dwReserved1]
or      ecx, 0FFFFFFFFh
repne scasb
not     ecx
dec     ecx
lea     edi, [esp+154h+FindFileData.cFileName]
mov     edx, ecx
or      ecx, 0FFFFFFFFh
repne scasb
not     ecx
dec     ecx
lea     eax, [edx+ecx+1]
push    eax             ; Size
call    ds:malloc
mov     edx, [esp+158h+lpFileName]
mov     ebp, eax
mov     edi, edx
or      ecx, 0FFFFFFFFh
xor     eax, eax
push    offset a_exe    ; ".exe"
repne scasb
not     ecx
```

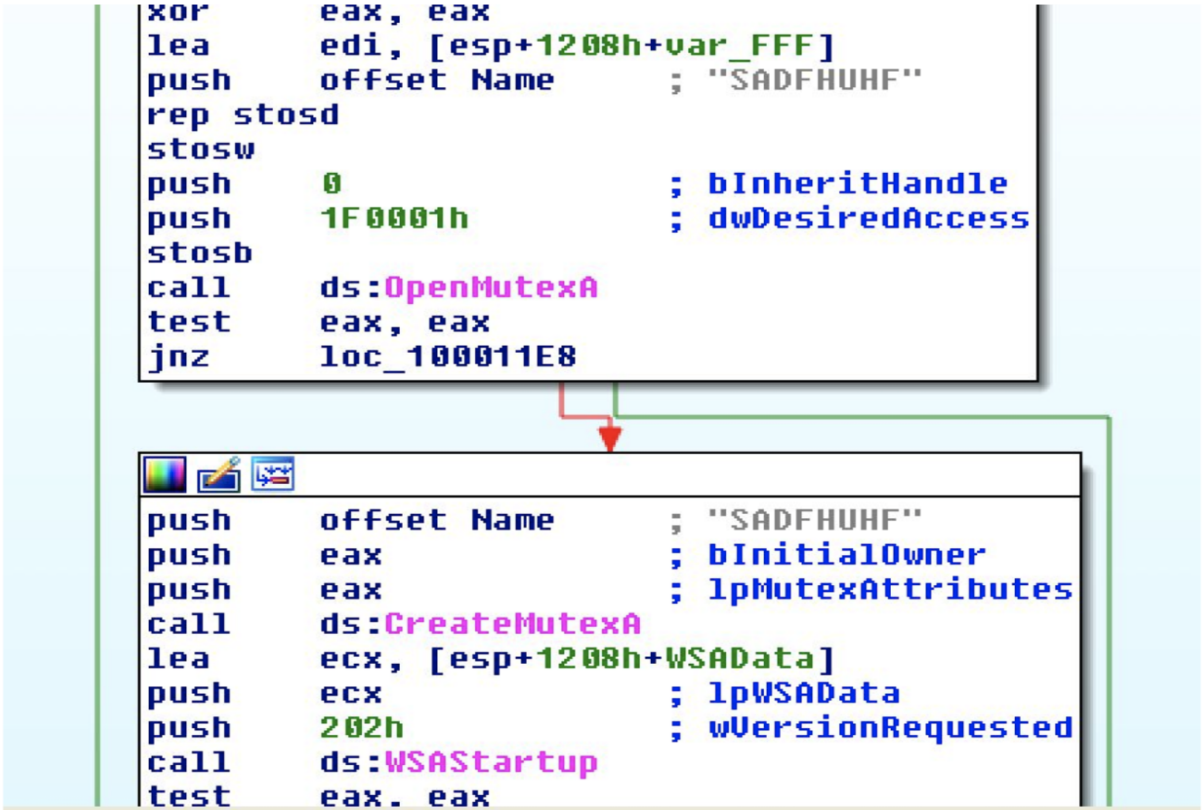
The program searches for all files with suffix ".exe" in the sub function.

```
loc_4017D4:
mov     ecx, [esp+54h+hObject]
mov     esi, ds:CloseHandle
push    ecx             ; hObject
call    esi ; CloseHandle
mov     edx, [esp+54h+var_4]
push    edx             ; hObject
call    esi ; CloseHandle
push    0               ; bFailIfExists
push    offset NewFileName ; "C:\\windows\\system32\\kerne132.dll"
push    offset ExistingFileName ; "Lab07-03.dll"
call    ds:CopyFileA
test    eax, eax
push    0               ; int
jnz     short loc_401806
```

Since the program calls two functions CreateFileA and CreateFileMappingA, it reveals that the program creates a fake Kernel32.dll called Kerne132.dll and map the file into the memory. And replace all .exe imported Kernel32.dll with Kerne132.dll.

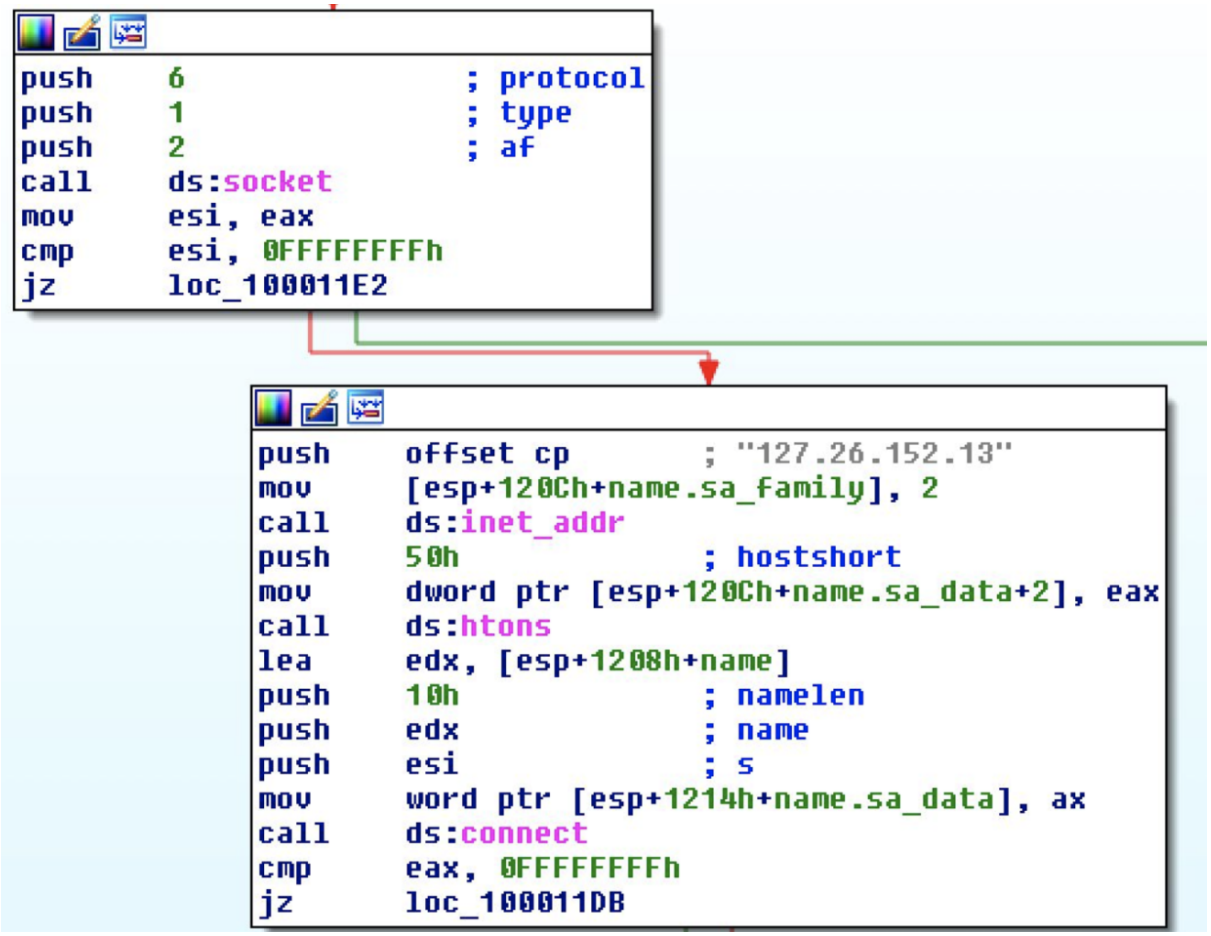
2. What are two good host-based signatures for this malware?

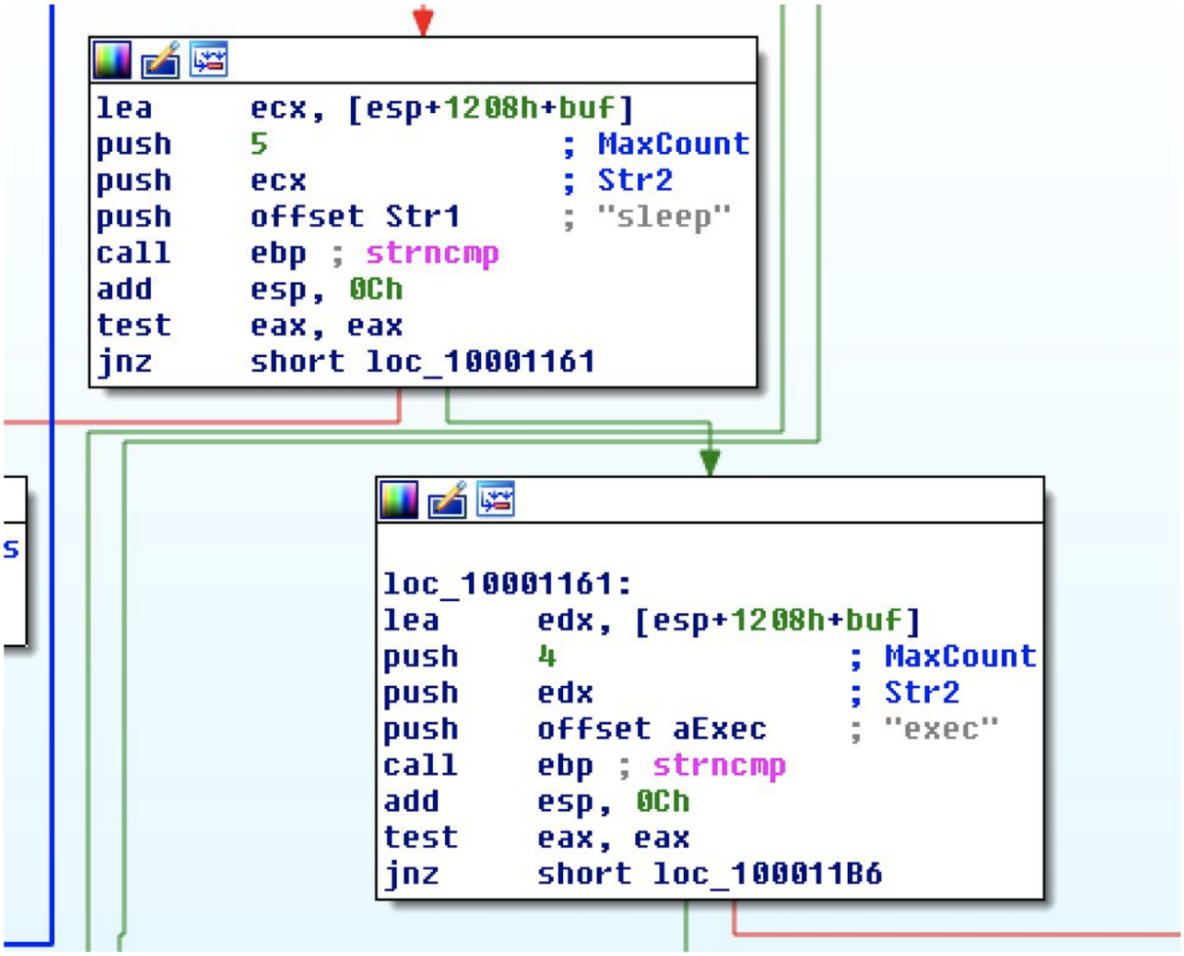
One is the fake filename “kerne123.dll” and the other one is the mutex called “SADFHUHF”.



3. What is the purpose of this program?

The program makes the machine connect to the remote host. Then, it makes the machine follow the instructions from the remote host.





4. How could you remove this malware once it is installed?

Actually, it is kind of difficult to remove the malware from the computer once it is installed because it has been imported by all the ".exe" files. Therefore, there is a way to modify the fake kerne132.dll file again to no longer be a malicious.