S11-L1

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Task

With reference to the excerpts from a real malware present in the next slides, answer the following questions:

- **Describe how the malware gains persistence, highlighting the assembly code where the relevant instructions and function calls are executed.**
- **Identify the client software used by the malware to connect to the Internet.**
- **Identify the URL the malware attempts to connect to and highlight the function call that allows the malware to connect to a URL.**
- **BONUS: What is the meaning and function of the assembly command "lea"**

Traccia:

```
)040286F   push    2               ; samDesired
)0402871   push    eax             ; ulOptions
)0402872   push    offset SubKey   ; "Software\\Microsoft\\Windows\\CurrentVersion\\Run"
)0402877   push    HKEY_LOCAL_MACHINE ; hKey
)040287C   call    esi ; RegOpenKeyExW
)040287E   test    eax, eax
)0402880   jnz     short loc_4028C5
)0402882
)0402882 loc_402882:
)0402882   lea     ecx, [esp+424h+Data]
)0402886   push    ecx             ; lpString
)0402887   mov     bl, 1
)0402889   call    ds:lstrlenW
)040288F   lea     edx, [eax+eax+2]
)0402893   push    edx             ; cbData
)0402894   mov     edx, [esp+428h+hKey]
)0402898   lea     eax, [esp+428h+Data]
)040289C   push    eax             ; lpData
)040289D   push    1               ; dwType
)040289F   push    0               ; Reserved
)04028A1   lea     ecx, [esp+434h+ValueName]
)04028A8   push    ecx             ; lpValueName
)04028A9   push    edx             ; hKey
)04028AA   call    ds:RegSetValueExW
```

Traccia:

```
.text:00401150 ; ||||||||||||||| S U B R O U T I N E |||||||||||||||||||||||||||||||||||||||
.text:00401150
.text:00401150
.text:00401150 ; DWORD __stdcall StartAddress(LPVOID)
.text:00401150 StartAddress    proc near               ; DATA XREF: sub_401040+EC↑o
.text:00401150                 push    esi
.text:00401151                 push    edi
.text:00401152                 push    0               ; dwFlags
.text:00401154                 push    0               ; lpszProxyBypass
.text:00401156                 push    0               ; lpszProxy
.text:00401158                 push    1               ; dwAccessType
.text:0040115A                 push    offset szAgent  ; "Internet Explorer 8.0"
.text:0040115F                 call    ds:InternetOpenA
.text:00401165                 mov     edi, ds:InternetOpenUrlA
.text:0040116B                 mov     esi, eax
.text:0040116D
.text:0040116D loc_40116D:                             ; CODE XREF: StartAddress+30↓j
.text:0040116D                 push    0               ; dwContext
.text:0040116F                 push    80000000h       ; dwFlags
.text:00401174                 push    0               ; dwHeadersLength
.text:00401176                 push    0               ; lpszHeaders
.text:00401178                 push    offset szUrl    ; "http://www.malware12COM
.text:0040117D                 push    esi             ; hInternet
.text:0040117E                 call    edi ; InternetOpenUrlA
.text:00401180                 jmp     short loc_40116D
.text:00401180 StartAddress    endp
.text:00401180
```

OBTAINING PERSISTENCE

Describe how the malware gains persistence, highlighting the assembly code where the relative instructions and function calls are executed

PUSH OFFSET SUBKEY

The malware achieves persistence by inserting a new value in the registry key "Software\Microsoft\Windows\CurrentVersion\Run," which contains the list of programs started at the operating system's startup.

```
)040287C   call    esi ; RegOpenKeyExW
```

It is a programming function used to open a specific registry key in the Windows system registry.

```
)04028AA   call    ds:RegSetValueExW
```

It allows creating new values within a registry key or overwriting existing values, thus enabling the malware to insert new values.

CLIENT SOFTWARE

Identify the client software used by the malware to connect to the Internet.

Traccia:

```
.text:00401150 ; ||||||||||||||| S U B R O U T I N E |||||||||||||||||||||||||||||||||||||||
.text:00401150
.text:00401150
.text:00401150 ; DWORD __stdcall StartAddress(LPVOID)
.text:00401150 StartAddress    proc near               ; DATA XREF: sub_401040+EC↑o
.text:00401150                 push    esi
.text:00401151                 push    edi
.text:00401152                 push    0               ; dwFlags
.text:00401154                 push    0               ; lpszProxyBypass
.text:00401156                 push    0               ; lpszProxy
.text:00401158                 push    1               ; dwAccessType
.text:0040115A                 push    offset szAgent  ; "Internet Explorer 8.0"
.text:0040115F                 call    ds:InternetOpenA
```

Il browser utilizzato dal malware è Internet Explorer - versione 8.0.

URL MALWARE

Identifying the URL the malware attempts to connect to and highlighting the function call for connecting to an URL

```
.text:0040116D loc_40116D:                             ; CODE XREF: StartAddress+30↓j
.text:0040116D                 push    0               ; dwContext
.text:0040116F                 push    80000000h       ; dwFlags
.text:00401174                 push    0               ; dwHeadersLength
.text:00401176                 push    0               ; lpszHeaders
.text:00401178                 push    offset szUrl    ; "http://www.malware12COM
.text:0040117D                 push    esi             ; hInternet
.text:0040117E                 call    edi ; InternetOpenUrlA
```

Tries to push the URL http://www.malware12.com with the next function call ***InternetOpenUrlA***

BONUS

Meaning and Functionality of the Assembly Command "lea"

The assembly command "lea" (Load Effective Address) is used to calculate the effective address of a variable or a memory area and load it into a register without accessing or modifying the content of the memory itself. The syntax of the "lea" command varies depending on the specific processor architecture. Here's an example of using the "lea" command in x86 assembly:

lea eax, [ebx + 8]

This calculates the effective address by taking the base address in ***ebx***, and then adding an offset of 8 bytes, the resulting address is loaded into the ***eax*** register.