Automating Qakbot Detection at Scale With Velociraptor

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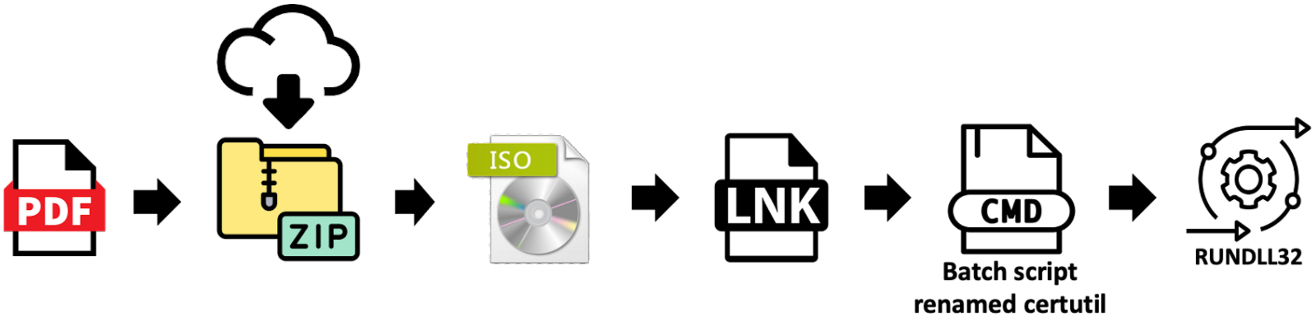
In this blog, you will learn a practical methodology to extract configuration data from recent Qakbot samples. I will provide some background on Qakbot, then walk through decode themes in an easy to visualize manner. Additionally, I'll share a Velociraptor artifact to detect and automate the decode process at scale.

QakBot or QBot, is a modular malware first observed in 2007 that has been historically known as a banking Trojan. Qakbot is used to steal credentials, financial, or other endpoint data, and in recent years, regularly a loader for other malware leading to hands-on-keyboard ransomware.

Malicious emails typically include a zipped attachment, LNK, Javascript, Documents, or an embedded executable. The example shown in this post was delivered by an email with an attached pdf file:



An example Qakbot infection chain

Qakbot has some notable defense evasion capabilities including:

1. Checking for Windows Defender sandbox and terminating on discovery.
2. Checking for the presence of running anti-virus or analysis tools, then modifying its later stage behavior for evasion.
3. Dynamic corruption of payload on startup and rewrite on system shutdown.

Due to the commodity nature of Qakbot delivery, capabilities, and end game, it is worth extracting configuration from observed samples to scope impact from a given campaign. Hunting enterprise-wide and finding a previously missed machine or discovering an ineffective control can prevent a domain-wide ransomware event or similar cyber attacks.

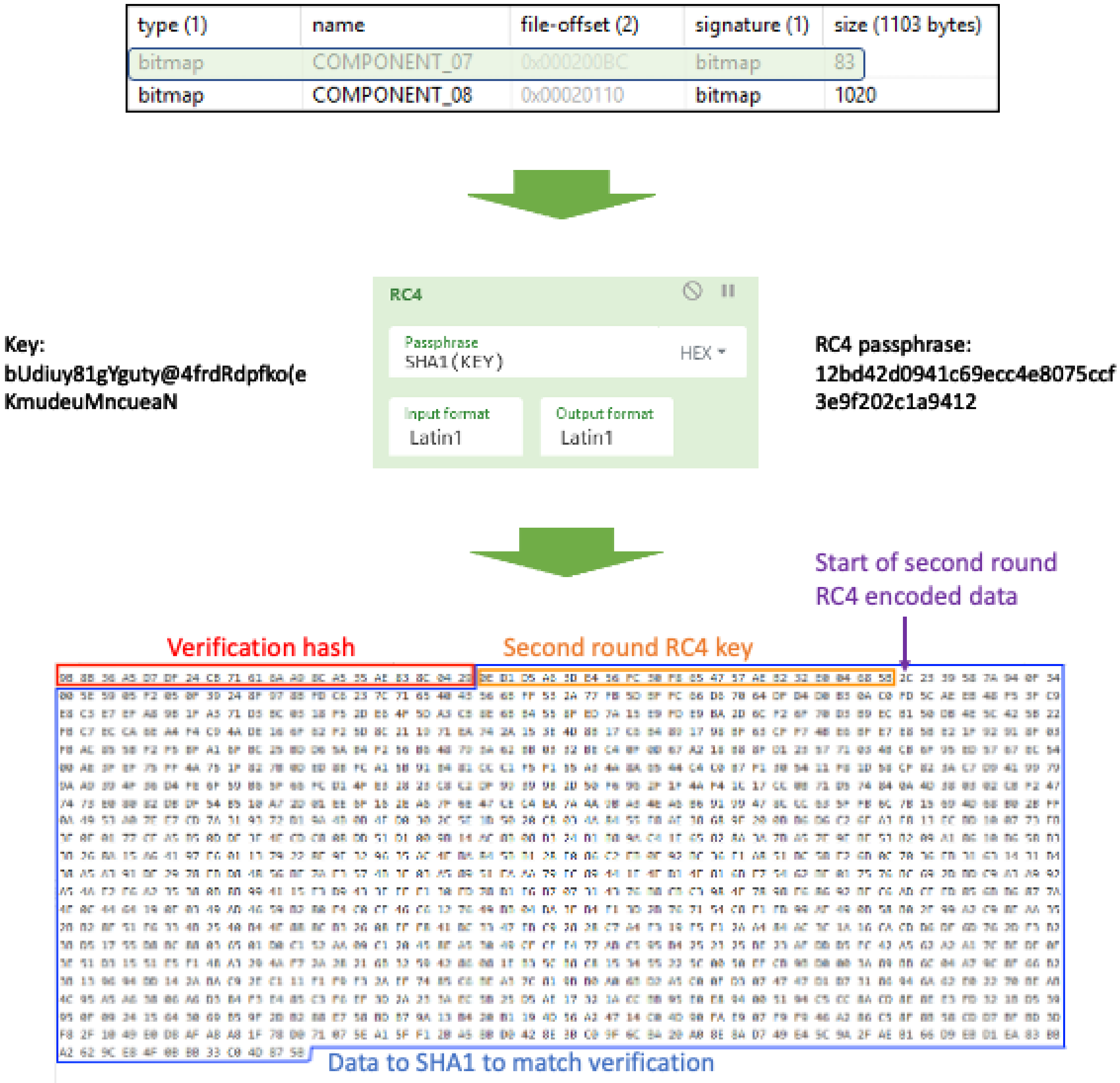
Configuration

Qakbot has an RC4 encoded configuration, located inside two resources of the unpacked payload binary. The decryption process has not changed significantly in recent times, but for some minor key changes. It uses a SHA1 of a hard coded key that can typically be extracted as an encoded string in the .data section of the payload binary. This key often remains static across campaigns, which can speed up analysis if we maintain a recent key list.

Current samples undergo two rounds of RC4 decryption with validation built in. The validation bytes dropped from the data for the second round.

After the first round:

- The first 20 bytes in hex is for validation and is compared with the SHA1 of the remaining decoded data
- Bytes [20:40] is the key used for the second round of decoding.
- The Data to decode is byte [40:] onwards
- The same validation process occurs for the second round decoded data
- Verification = data[:20]
- DecodedData = data[20:]



type (1)	name	file-offset (2)	signature (1)	size (1103 bytes)
bitmap	COMPONENT_07	0x000200BC	bitmap	83
bitmap	COMPONENT_08	0x00020110	bitmap	1020

Key:
bUdiuy81gYguty@4frdRdpfko(eKmudeuMncueaN

RC4
Passphrase: SHA1(KEY) HEX
Input format: Latin1
Output format: Latin1

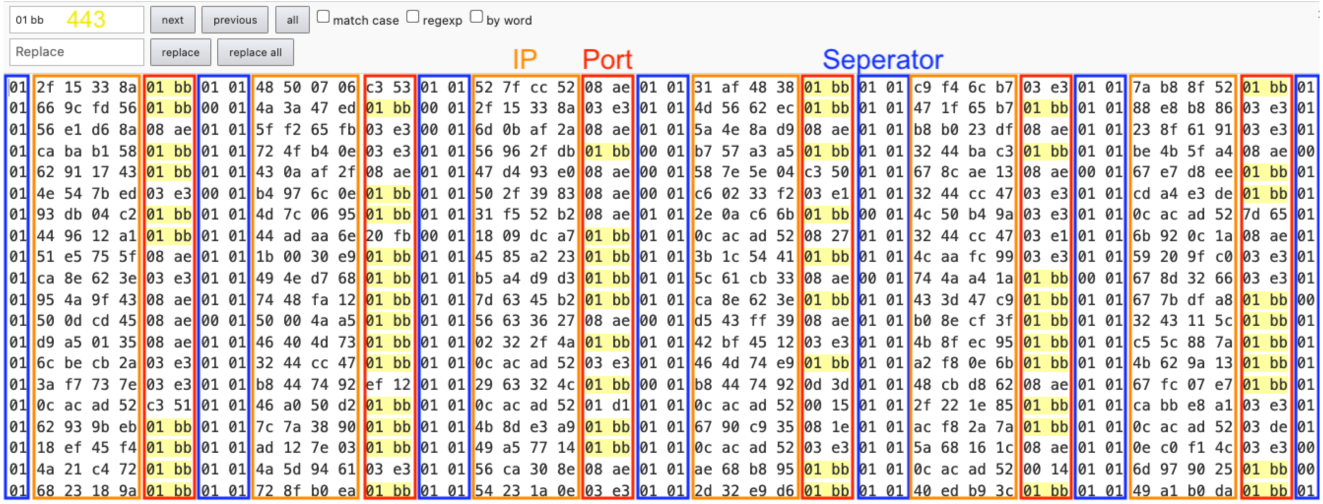
RC4 passphrase:
12bd42d0941c69ecc4e8075ccf3e9f202c1a9412

First round of Qakbot decode and verification

Campaign information is located inside the smaller resource where, after this decoding and verification process, data is clear text.

```
10=BB16
3=1677046917
```

The larger resource stores Command and Control configuration. This is typically stored in netaddress format with varying separators. A common technique for finding the correct method is searching for common ports and separator patterns in the decoded data.



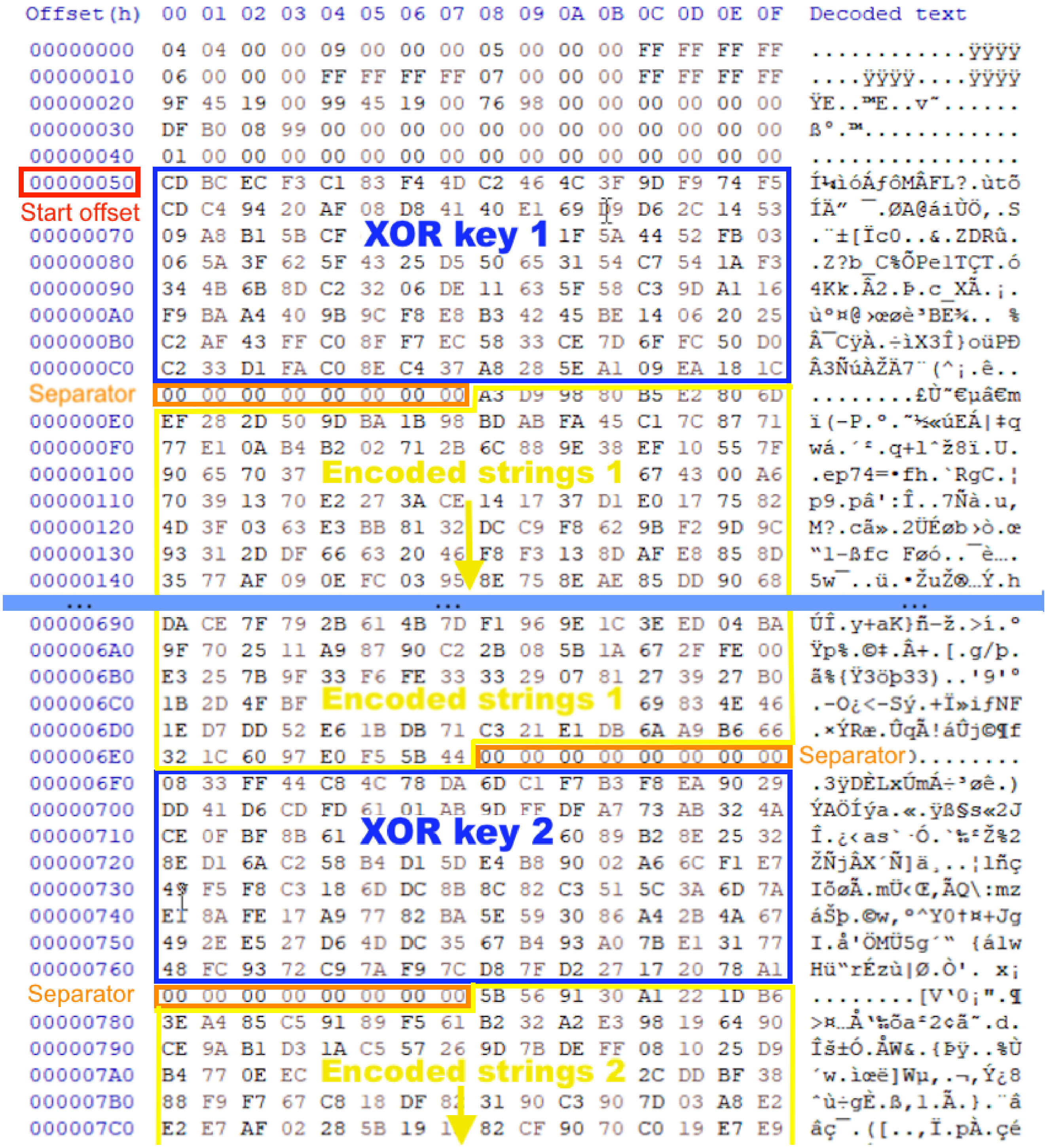
```
01 2f 15 33 8a 01 bb 01 01 48 50 07 06 c3 53 01 01 52 7f cc 52 08 ae 01 01 31 af 48 38 01 bb 01 01 c9 f4 6c b7 03 e3 01 01 7a b8 8f 52 01 bb 01
01 66 9c fd 56 01 bb 00 01 4a 3a 47 ed 01 bb 00 01 2f 15 33 8a 03 e3 01 01 4d 56 62 ec 01 bb 01 01 47 1f 65 b7 01 bb 01 01 88 e8 b8 86 03 e3 01
01 56 e1 d6 8a 08 ae 01 01 5f f2 65 fb 03 e3 00 01 6d 0b af 2a 08 ae 01 01 5a 4e 8a d9 08 ae 01 01 b8 b0 23 df 08 ae 01 01 23 8f 61 91 03 e3 01
01 ca ba b1 58 01 bb 01 01 72 4f b4 0e 03 e3 01 01 56 96 2f db 01 bb 00 01 b7 57 a3 a5 01 bb 01 01 32 44 ba c3 01 bb 01 01 be 4b 5f a4 08 ae 00
01 62 91 17 43 01 bb 01 01 43 0a af 2f 08 ae 01 01 47 d4 93 e0 08 ae 00 01 58 7e 5e 04 c3 50 01 01 67 8c ae 13 08 ae 00 01 67 e7 d8 ee 01 bb 01
01 4e 54 7b ed 03 e3 00 01 b4 97 6c 0e 01 bb 01 01 50 2f 39 83 08 ae 00 01 c6 02 33 f2 03 e1 01 01 32 44 cc 47 03 e3 01 01 cd a4 e3 de 01 bb 01
01 93 db 04 c2 01 bb 01 01 4d 7c 06 95 01 bb 01 01 31 f5 52 b2 08 ae 01 01 2e 0a c6 6b 01 bb 00 01 4c 50 b4 9a 03 e3 01 01 0c ac ad 52 7d 65 01
01 44 96 12 a1 01 bb 01 01 44 ad aa 6e 20 fb 00 01 18 09 dc a7 01 bb 01 01 0c ac ad 52 08 27 01 01 32 44 cc 47 03 e1 01 01 6b 92 0c 1a 08 ae 01
01 51 e5 75 5f 08 ae 01 01 1b 00 30 e9 01 bb 01 01 45 85 a2 23 01 bb 01 01 3b 1c 54 41 01 bb 01 01 4c aa fc 99 03 e3 01 01 59 20 9f c0 03 e3 01
01 ca 8e 62 3e 03 e3 01 01 49 4e d7 68 01 bb 01 01 b5 a4 d9 d3 01 bb 01 01 5c 61 cb 33 08 ae 00 01 74 4a a4 1a 01 bb 00 01 67 8d 32 66 03 e3 01
01 95 4a 9f 43 08 ae 01 01 74 48 fa 12 01 bb 01 01 7d 63 45 b2 01 bb 01 01 ca 8e 62 3e 01 bb 01 01 43 3d 47 c9 01 bb 01 01 67 7b df a8 01 bb 00
01 50 0d cd 45 08 ae 00 01 50 00 4a a5 01 bb 01 01 56 63 36 27 08 ae 00 01 d5 43 ff 39 08 ae 01 01 b0 8e cf 3f 01 bb 01 01 32 43 11 5c 01 bb 01
01 d9 a5 01 35 08 ae 01 01 46 40 4d 73 01 bb 01 01 02 32 2f 4a 01 bb 01 01 42 bf 45 12 03 e3 01 01 4b 8f ec 95 01 bb 01 01 c5 5c 88 7a 01 bb 01
01 6c be cb 2a 03 e3 01 01 32 44 cc 47 01 bb 01 01 0c ac ad 52 03 e3 01 01 46 4d 74 e9 01 bb 01 01 a2 f8 0e 6b 01 bb 01 01 4b 62 9a 13 01 bb 01
01 3a f7 73 7e 03 e3 01 01 b8 44 74 92 ef 12 01 01 29 63 32 4c 01 bb 00 01 b8 44 74 92 0d 3d 01 01 48 cb d8 62 08 ae 01 01 67 fc 07 e7 01 bb 01
01 0c ac ad 52 c3 51 01 01 46 a0 50 d2 01 bb 01 01 0c ac ad 52 01 d1 01 01 0c ac ad 52 00 15 01 01 2f 22 1e 85 01 bb 01 01 ca bb e8 a1 03 e3 01
01 62 93 9b eb 01 bb 01 01 7c 7a 38 90 01 bb 01 01 4b 8d e3 a9 01 bb 01 01 67 90 c9 35 08 1e 01 01 ac f8 2a 7a 01 bb 01 01 0c ac ad 52 03 de 01
01 18 ef 45 f4 01 bb 01 01 ad 12 7e 03 01 bb 01 01 49 a5 77 14 01 bb 01 01 0c ac ad 52 03 e3 01 01 5a 68 16 1c 08 ae 01 01 0e c0 f1 4c 03 e3 00
01 4a 21 c4 72 01 bb 01 01 4a 5d 94 61 03 e3 01 01 56 ca 30 8e 08 ae 01 01 ae 68 b8 95 01 bb 01 01 0c ac ad 52 00 14 01 01 6d 97 90 25 01 bb 00
01 68 23 18 9a 01 bb 01 01 72 8f b0 ea 01 bb 01 01 54 23 1a 0e 03 e3 01 01 2d 32 e9 d6 01 bb 01 01 40 ed b9 3c 01 bb 01 01 49 a1 b0 da 01 bb 01
```

Easy to spot C2 patterns: port 443

Encoded strings

Qakbot stores blobs of xor encoded strings inside the .data section of its payload binary. The current methodology is to extract blobs of key and data from the referenced key offset which similarly is reused across samples.

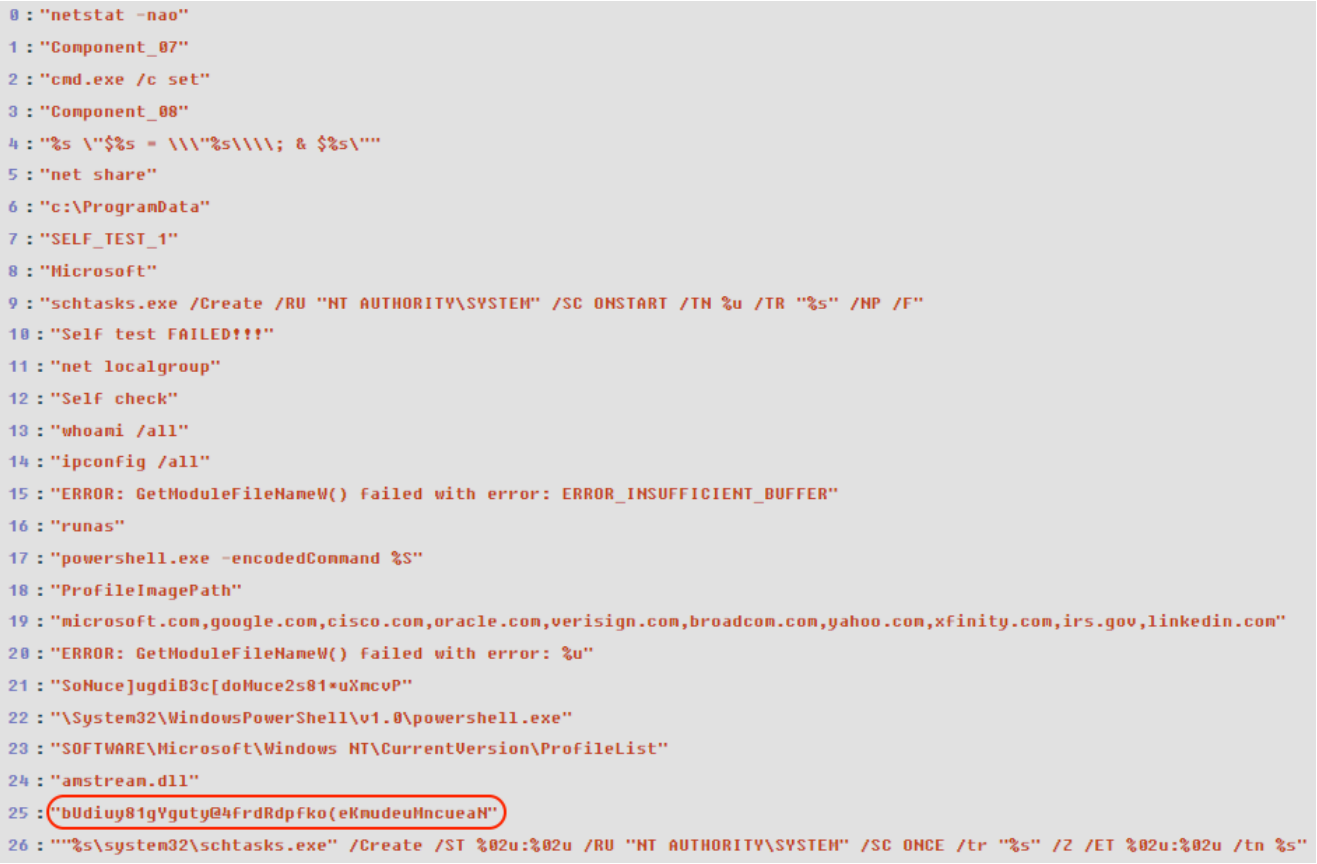
Current samples start at offset 0x50, with an xor key, followed by a separator of 0x0000 before encoded data. In recent samples, we have observed more than one string blob and these have occurred in the same format after the separator.



```
Offset(h) 00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F  Decoded text

00000000  04 04 00 00 09 00 00 00 05 00 00 00 FF FF FF FF  ............ÿÿÿÿ
00000010  06 00 00 00 FF FF FF FF 07 00 00 00 FF FF FF FF  ....ÿÿÿÿ....ÿÿÿÿ
00000020  9F 45 19 00 99 45 19 00 76 98 00 00 00 00 00 00  ŸE..™E..v˜......
00000030  DF B0 08 99 00 00 00 00 00 00 00 00 00 00 00 00  ß°.™............
00000040  01 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00000050  CD BC EC F3 C1 83 F4 4D C2 46 4C 3F 9D F9 74 F5  Í¼ìóÁƒôMÂFL?.ùtõ
          CD C4 94 20 AF 08 D8 41 40 E1 69 D9 D6 2C 14 53  ÍÄ” ¯.ØA@áiÙÖ,.S
00000070  09 A8 B1 5B CF                1F 5A 44 52 FB 03  .¨±[ÏcO..&.ZDRû.
00000080  06 5A 3F 62 5F 43 25 D5 50 65 31 54 C7 54 1A F3  .Z?b_C%ÕPe1TÇT.ó
00000090  34 4B 6B 8D C2 32 06 DE 11 63 5F 58 C3 9D A1 16  4Kk.Â2.Þ.c_XÃ.¡.
000000A0  F9 BA A4 40 9B 9C F8 E8 B3 42 45 BE 14 06 20 25  ù°¤@›œøè³BE¾.. %
000000B0  C2 AF 43 FF C0 8F F7 EC 58 33 CE 7D 6F FC 50 D0  Â¯CÿÀ.÷ìX3Î}oüPÐ
000000C0  C2 33 D1 FA C0 8E C4 37 A8 28 5E A1 09 EA 18 1C  Â3ÑúÀŽÄ7¨(^¡.ê..
          00 00 00 00 00 00 00 00 A3 D9 98 80 B5 E2 80 6D  ........£Ù˜€µâ€m
000000E0  EF 28 2D 50 9D BA 1B 98 BD AB FA 45 C1 7C 87 71  ï(-P.°.˜½«úEÁ|‡q
000000F0  77 E1 0A B4 B2 02 71 2B 6C 88 9E 38 EF 10 55 7F  wá.´².q+lˆž8ï.U.
00000100  90 65 70 37                   67 43 00 A6  .ep74=•fh.`RgC.¦
00000110  70 39 13 70 E2 27 3A CE 14 17 37 D1 E0 17 75 82  p9.pâ':Î..7Ñà.u‚
00000120  4D 3F 03 63 E3 BB 81 32 DC C9 F8 62 9B F2 9D 9C  M?.cã».2ÜÉøb›ò.œ
00000130  93 31 2D DF 66 63 20 46 F8 F3 13 8D AF E8 85 8D  “1-ßfc Føó..¯è….
00000140  35 77 AF 09 0E FC 03 95 8E 75 8E AE 85 DD 90 68  5w¯..ü.•ŽuŽ®…Ý.h
   ...                      ...                              ...
00000690  DA CE 7F 79 2B 61 4B 7D F1 96 9E 1C 3E ED 04 BA  ÚÎ.y+aK}ñ–ž.>í.º
000006A0  9F 70 25 11 A9 87 90 C2 2B 08 5B 1A 67 2F FE 00  Ÿp%.©‡.Â+.[.g/þ.
000006B0  E3 25 7B 9F 33 F6 FE 33 33 29 07 81 27 39 27 B0  ã%{Ÿ3öþ33)..'9'°
000006C0  1B 2D 4F BF                   69 83 4E 46  .-O¿<-Sý.+Ï»ifNF
000006D0  1E D7 DD 52 E6 1B DB 71 C3 21 E1 DB 6A A9 B6 66  .×ÝRæ.ÛqÃ!áÛj©¶f
000006E0  32 1C 60 97 E0 F5 5B 44 00 00 00 00 00 00 00 00  ).......
000006F0  08 33 FF 44 C8 4C 78 DA 6D C1 F7 B3 F8 EA 90 29  .3ÿDÈLxÚmÁ÷³øê.)
00000700  DD 41 D6 CD FD 61 01 AB 9D FF DF A7 73 AB 32 4A  ÝAÖÍýa.«.ÿß§s«2J
00000710  CE 0F BF 8B 61                60 89 B2 8E 25 32  Î.¿‹as`·Ó.`‰²Ž%2
00000720  8E D1 6A C2 58 B4 D1 5D E4 B8 90 02 A6 6C F1 E7  ŽÑjÂX´Ñ]ä¸..¦lñç
00000730  49 F5 F8 C3 18 6D DC 8B 8C 82 C3 51 5C 3A 6D 7A  IõøÃ.mÜ‹Œ‚ÃQ\:mz
00000740  E1 8A FE 17 A9 77 82 BA 5E 59 30 86 A4 2B 4A 67  áŠþ.©w‚º^Y0†¤+Jg
00000750  49 2E E5 27 D6 4D DC 35 67 B4 93 A0 7B E1 31 77  I.å'ÖMÜ5g´“ {á1w
00000760  48 FC 93 72 C9 7A F9 7C D8 7F D2 27 17 20 78 A1  Hü“rÉzù|Ø.Ò'. x¡
          00 00 00 00 00 00 00 00 5B 56 91 30 A1 22 1D B6  ........[V‘0¡".¶
00000780  3E A4 85 C5 91 89 F5 61 B2 32 A2 E3 98 19 64 90  >¤…Å‘‰õa²2¢ã˜.d.
00000790  CE 9A B1 D3 1A C5 57 26 9D 7B DE FF 08 10 25 D9  Îš±Ó.ÅW&.{Þÿ..%Ù
000007A0  B4 77 0E EC                   2C DD BF 38  ´w.ìœë]Wµ,.¬,Ý¿8
000007B0  88 F9 F7 67 C8 18 DF 82 31 90 C3 90 7D 03 A8 E2  ˆù÷gÈ.ß‚1.Ã.}.¨â
000007C0  E2 E7 AF 02 28 5B 19 1  82 CF 90 70 C0 19 E7 E9  âç¯.([..‚Ï.pÀ.çé
```

Encoded strings .data

Next steps are splitting on separators, decode expected blob pairs and drop any non printable. Results are fairly obvious when decoding is successful as Qakbot produces clean strings. I typically have seen two well defined groups with strings aligning to Qakbot capabilities.



```
0 : "netstat -nao"
1 : "Component_07"
2 : "cmd.exe /c set"
3 : "Component_08"
4 : "%s \"$%s = \\\"%s\\\\; & $%s\""
5 : "net share"
6 : "c:\ProgramData"
7 : "SELF_TEST_1"
8 : "Microsoft"
9 : "schtasks.exe /Create /RU "NT AUTHORITY\SYSTEM" /SC ONSTART /TN %u /TR "%s" /NP /F"
10 : "Self test FAILED!!!"
11 : "net localgroup"
12 : "Self check"
13 : "whoami /all"
14 : "ipconfig /all"
15 : "ERROR: GetModuleFileNameW() failed with error: ERROR_INSUFFICIENT_BUFFER"
16 : "runas"
17 : "powershell.exe -encodedCommand %S"
18 : "ProfileImagePath"
19 : "microsoft.com,google.com,cisco.com,oracle.com,verisign.com,broadcom.com,yahoo.com,xfinity.com,irs.gov,linkedin.com"
20 : "ERROR: GetModuleFileNameW() failed with error: %u"
21 : "SoNuce]ugdiB3c[doMuce2s81*uXmcvP"
22 : "\System32\WindowsPowerShell\v1.0\powershell.exe"
23 : "SOFTWARE\Microsoft\Windows NT\CurrentVersion\ProfileList"
24 : "amstream.dll"
25 : "bUdiuy81gYguty@4frdRdpfko(eKmudeuMncueaN"
26 : ""%s\system32\schtasks.exe" /Create /ST %02u:%02u /RU "NT AUTHORITY\SYSTEM" /SC ONCE /tr "%s" /Z /ET %02u:%02u /tn %s"
```

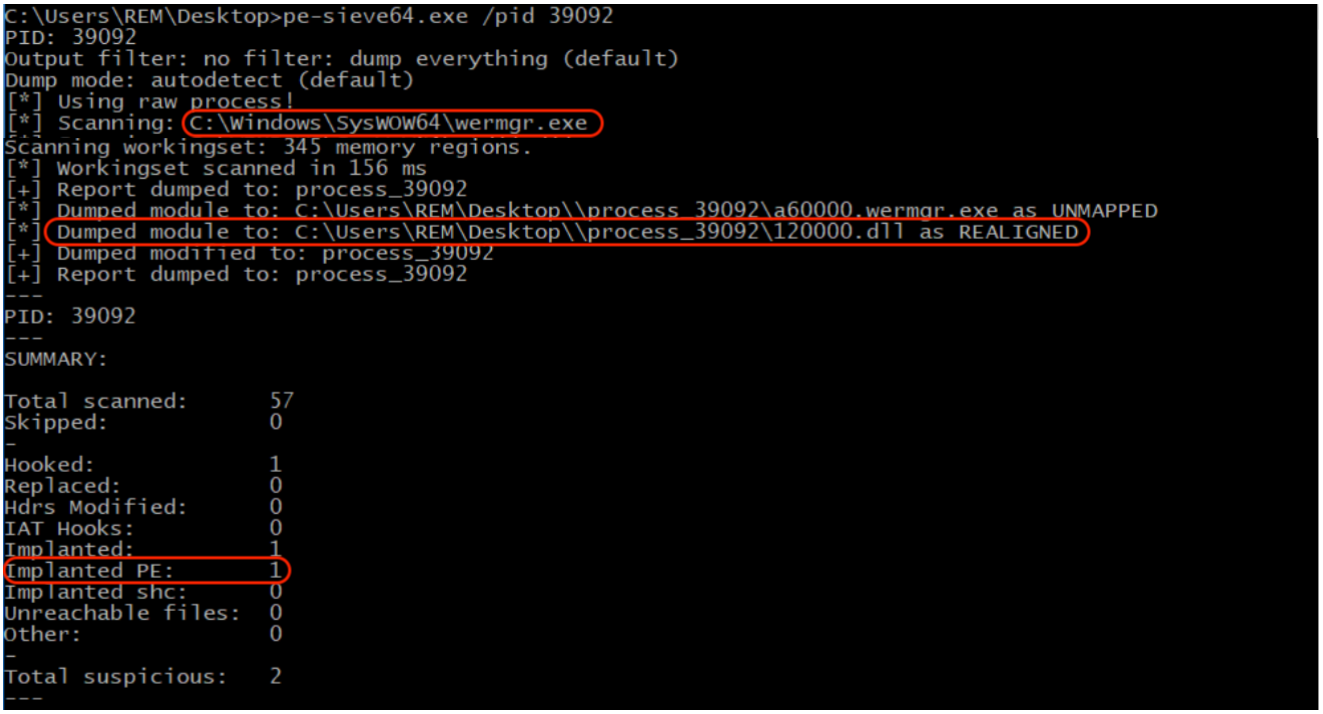
Decoded strings: RC4 key highlighted

Payload

Qakbot samples are typically packed and need execution or manual unpacking to retrieve the payload for analysis. It's very difficult to obtain this payload remotely at scale, in practice the easiest way is to execute the sample in a VM or sandbox that enables extracting the payload with correct PE offsets.

When executing locally Qakbot typically injects its payload into a Windows process, and can be detected with yara targeting the process for an unbacked section with `PAGE_EXECUTE_READWRITE` protections.

Below, we have an example of running PE-Sieve / Hollows Hunter tool from Hasherezade. This helpful tool enables detection of several types of process injection, and the dumping of injected sections with appropriately aligned headers. In this case, the injected process is `wermgr.exe` but it's worth to note, depending on variant and process footprint, your injected process may vary.



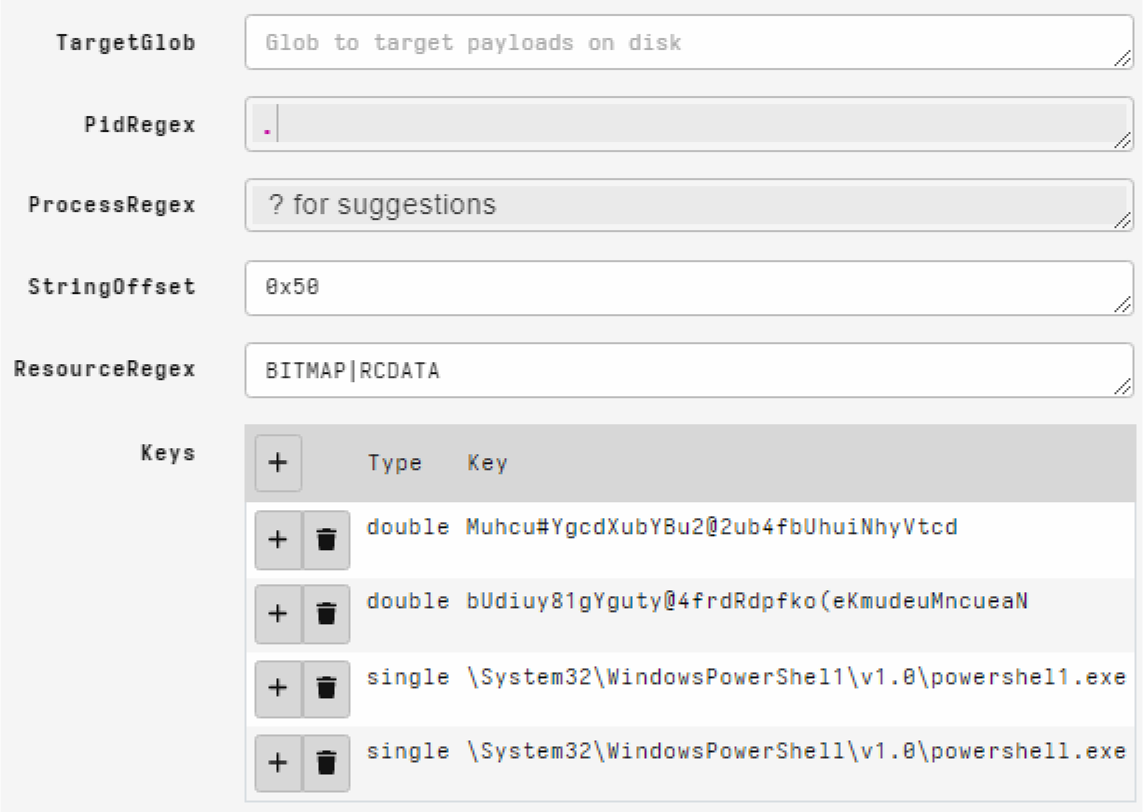
```
C:\Users\REM\Desktop>pe-sieve64.exe /pid 39092
PID: 39092
Output filter: no filter: dump everything (default)
Dump mode: autodetect (default)
[*] Using raw process!
[*] Scanning: C:\Windows\SysWOW64\wermgr.exe
Scanning workingset: 345 memory regions.
[*] Workingset scanned in 156 ms
[+] Report dumped to: process_39092
[*] Dumped module to: C:\Users\REM\Desktop\\process_39092\a60000.wermgr.exe as UNMAPPED
[*] Dumped module to: C:\Users\REM\Desktop\\process_39092\120000.dll as REALIGNED
[+] Dumped modified to: process_39092
[+] Report dumped to: process_39092
---
PID: 39092
---
SUMMARY:

Total scanned:      57
Skipped:            0
-
Hooked:             1
Replaced:           0
Hdrs Modified:      0
IAT Hooks:          0
Implanted:          1
Implanted PE:       1
Implanted shc:      0
Unreachable files:  0
Other:              0
-
Total suspicious:   2
---
```

Dumping Qakbot payload using pe-sieve

Automation at scale

Now I have explained the decode process, time to enable both detection and decode automation in Velociraptor.

I have recently released Windows.Carving.Qakbot which leverages a PE dump capability in Velociraptor 0.6.8 to enable live memory analysis. The goal of the artifact was to automate my decoding workflow for a generic Qakbot parser and save time for a common analysis. I also wanted an easy to update parser to add additional keys or decode nuances when changes are discovered.



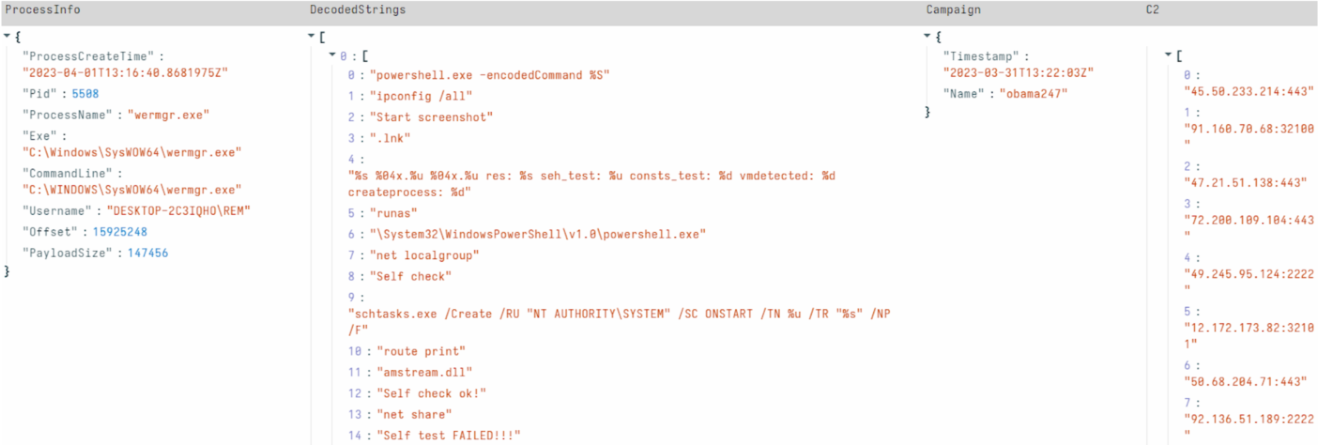
TargetGlob	Glob to target payloads on disk
PidRegex	.
ProcessRegex	? for suggestions
StringOffset	0x50
ResourceRegex	BITMAP|RCDATA
Keys	

Type	Key
double	Muhcu#YgcdXubYBu2@2ub4fbUhuiNhyVtcd
double	bUdiuy81gYguty@4frdRdpfko(eKmudeuMncueaN
single	\System32\WindowsPowerShe11\v1.0\powershe11.exe
single	\System32\WindowsPowerShell\v1.0\powershell.exe

Windows.Carving.Qakbot: parameters

This artifact uses Yara to detect an injected Qakbot payload, then attempts to parse the payload configuration and strings. Some of the features in the artifact cover changes observed in the past in the decryption process to allow a simplified extraction workflow:

- Automatic PE extraction and offset alignment for memory detections.
- StringOffset: the offset of the string xor key and encoded strings is reused regularly.
- PE resource type: the RC4 encoded configuration is typically inside 2 resources, I’ve observed BITMAP and RCDATA
- Unescaped key string: this field is typically reused over samples.
- Type of encoding: single or double, double being the more recent.
- Hidden TargetBytes parameter to enable piping payload in for analysis.
- Worker threads: for bulk analysis / research use cases.



```
ProcessInfo
{
  "ProcessCreateTime" :
  "2023-04-01T13:16:40.8681975Z"
  "Pid" : 5508
  "ProcessName" : "wermgr.exe"
  "Exe" :
  "C:\Windows\SysWOW64\wermgr.exe"
  "CommandLine" :
  "C:\WINDOWS\SysWOW64\wermgr.exe"
  "Username" : "DESKTOP-2C3IQHO\REM"
  "Offset" : 15925248
  "PayloadSize" : 147456
}
```

```
DecodedStrings
[
  0 : [
    0 : "powershell.exe -encodedCommand %S"
    1 : "ipconfig /all"
    2 : "Start screenshot"
    3 : ".lnk"
    4 :
    "%s %04x.%u %04x.%u res: %s seh_test: %u consts_test: %d vmdetected: %d
    createprocess: %d"
    5 : "runas"
    6 : "\System32\WindowsPowerShell\v1.0\powershell.exe"
    7 : "net localgroup"
    8 : "Self check"
    9 :
    "schtasks.exe /Create /RU "NT AUTHORITY\SYSTEM" /SC ONSTART /TN %u /TR "%s" /NP
    /F"
    10 : "route print"
    11 : "amstream.dll"
    12 : "Self check ok!"
    13 : "net share"
    14 : "Self test FAILED!!!"
```

```
Campaign
{
  "Timestamp" :
  "2023-03-31T13:22:03Z"
  "Name" : "obama247"
}
```

```
C2
[
  0 :
  "45.50.233.214:443"
  1 :
  "91.160.70.68:32100
  "
  2 :
  "47.21.51.138:443"
  3 :
  "72.200.109.104:443
  "
  4 :
  "49.245.95.124:2222
  "
  5 :
  "12.172.173.82:3210
  1"
  6 :
  "50.68.204.71:443"
  7 :
  "92.136.51.189:2222
  "
```

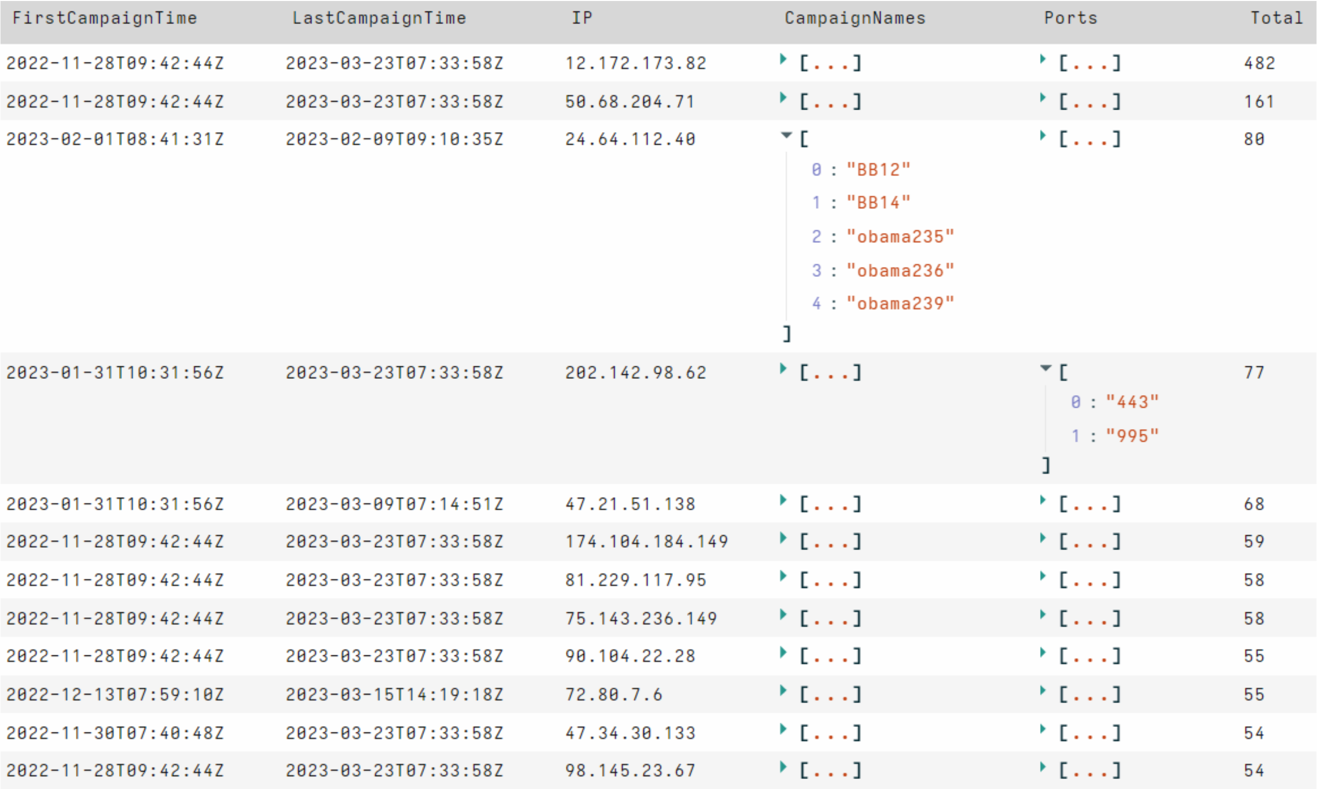
Windows.Carving.Qakbot: live decode

Research

The Qakbot parser can also be leveraged for research and run bulk analysis. One caveat is the content requires payload files that have been dumped with offsets intact. This typically requires some post collection filtering or PE offset realignment but enables Velociraptor notebook to manipulate post processed data.

Some techniques I have used to bulk collect samples:

- Sandbox with PE dumping features: api based collection
- Virustotal search: *crowdsourced_yara_rule:0083a00b09|win_qakbot_auto AND tag:pedll AND NOT tag:corrupt* (not this will collect some broken payloads)



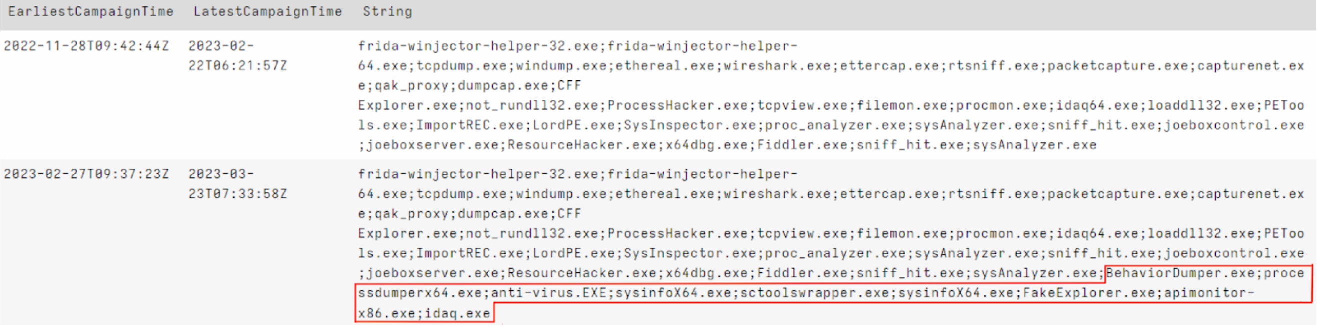
FirstCampaignTime	LastCampaignTime	IP	CampaignNames	Ports	Total
2022-11-28T09:42:44Z	2023-03-23T07:33:58Z	12.172.173.82	▸ [...]	▸ [...]	482
2022-11-28T09:42:44Z	2023-03-23T07:33:58Z	50.68.204.71	▸ [...]	▸ [...]	161
2023-02-01T08:41:31Z	2023-02-09T09:10:35Z	24.64.112.40	▾ [0 : "BB12" 1 : "BB14" 2 : "obama235" 3 : "obama236" 4 : "obama239"]	▸ [...]	80
2023-01-31T10:31:56Z	2023-03-23T07:33:58Z	202.142.98.62	▸ [...]	▾ [0 : "443" 1 : "995"]	77
2023-01-31T10:31:56Z	2023-03-09T07:14:51Z	47.21.51.138	▸ [...]	▸ [...]	68
2022-11-28T09:42:44Z	2023-03-23T07:33:58Z	174.104.184.149	▸ [...]	▸ [...]	59
2022-11-28T09:42:44Z	2023-03-23T07:33:58Z	81.229.117.95	▸ [...]	▸ [...]	58
2022-11-28T09:42:44Z	2023-03-23T07:33:58Z	75.143.236.149	▸ [...]	▸ [...]	58
2022-11-28T09:42:44Z	2023-03-23T07:33:58Z	90.104.22.28	▸ [...]	▸ [...]	55
2022-12-13T07:59:10Z	2023-03-15T14:19:18Z	72.80.7.6	▸ [...]	▸ [...]	55
2022-11-30T07:40:48Z	2023-03-23T07:33:58Z	47.34.30.133	▸ [...]	▸ [...]	54
2022-11-28T09:42:44Z	2023-03-23T07:33:58Z	98.145.23.67	▸ [...]	▸ [...]	54

Bulk collection: IPs seen across multiple campaign names and ports

Some findings from a small data set ~60 samples:

- Named campaigns are typically short and not longer than a few samples over a few days.
- IP addresses are regularly reused and shared across campaigns
- Most prevalent campaigns are "BB" and "obama" prefixed
- Minor campaigns observed: "azd", "tok" and "rds" with only one or two observed payload samples each.

Strings analysis can also provide insights to sample behavior over time to assist analysis. A great example is the adding to process name list for anti-analysis checks.



EarliestCampaignTime	LatestCampaignTime	String
2022-11-28T09:42:44Z	2023-02-22T06:21:57Z	frida-winjector-helper-32.exe;frida-winjector-helper-64.exe;tcpdump.exe;windump.exe;ethereal.exe;wireshark.exe;ettercap.exe;rtsniff.exe;packetcapture.exe;capturenet.exe;qak_proxy;dumpcap.exe;CFF Explorer.exe;not_rundll32.exe;ProcessHacker.exe;tcpview.exe;filemon.exe;procmon.exe;idaq64.exe;loaddll32.exe;PETools.exe;ImportREC.exe;LordPE.exe;SysInspector.exe;proc_analyzer.exe;sysAnalyzer.exe;sniff_hit.exe;joeboxcontrol.exe;joeboxserver.exe;ResourceHacker.exe;x64dbg.exe;Fiddler.exe;sniff_hit.exe;sysAnalyzer.exe
2023-02-27T09:37:23Z	2023-03-23T07:33:58Z	frida-winjector-helper-32.exe;frida-winjector-helper-64.exe;tcpdump.exe;windump.exe;ethereal.exe;wireshark.exe;ettercap.exe;rtsniff.exe;packetcapture.exe;capturenet.exe;qak_proxy;dumpcap.exe;CFF Explorer.exe;not_rundll32.exe;ProcessHacker.exe;tcpview.exe;filemon.exe;procmon.exe;idaq64.exe;loaddll32.exe;PETools.exe;ImportREC.exe;LordPE.exe;SysInspector.exe;proc_analyzer.exe;sysAnalyzer.exe;sniff_hit.exe;joeboxcontrol.exe;joeboxserver.exe;ResourceHacker.exe;x64dbg.exe;Fiddler.exe;sniff_hit.exe;sysAnalyzer.exe;BehaviorDumper.exe;processdumperx64.exe;anti-virus.EXE;sysinfoX64.exe;sctoolswrapper.exe;sysinfoX64.exe;FakeExplorer.exe;apimonitor-x86.exe;idaq.exe

Bulk collection: Strings highlighting anti-analysis check additions over time

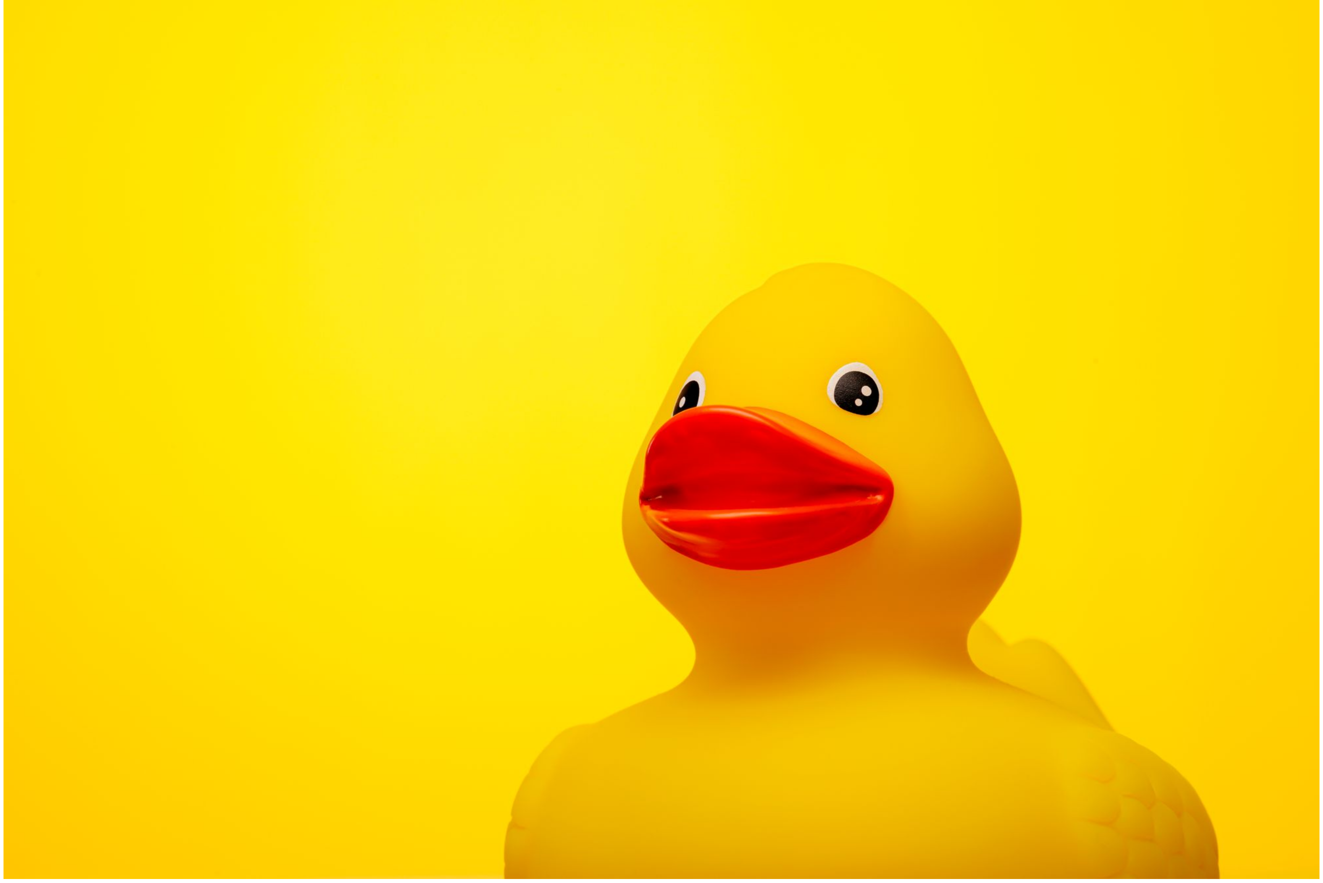
Conclusion

PE dumping, which is not available in expensive paid tools, is a useful capability and enables advanced capability at enterprise scale. For widespread threats like Qakbot, this kind of content can significantly improve response for blue teams, or even provide insights into threats when analyzed in bulk. In the coming months, we will be publishing a series of similar blog posts, offering a sneak peek at some of the types of memory analysis enabled by Velociraptor and incorporated into our training courses.

I also would like to thank Jakob Denlinger and James Dunne for their assistance in writing this post.

References

1. Malpedia, QakBot
2. Elastic, QBOT Malware Analysis
3. @hasherezade. Hollows Hunter, https://github.com/hasherezade/hollows_hunter



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