If at first, you don't succeed, try something else

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Agenda

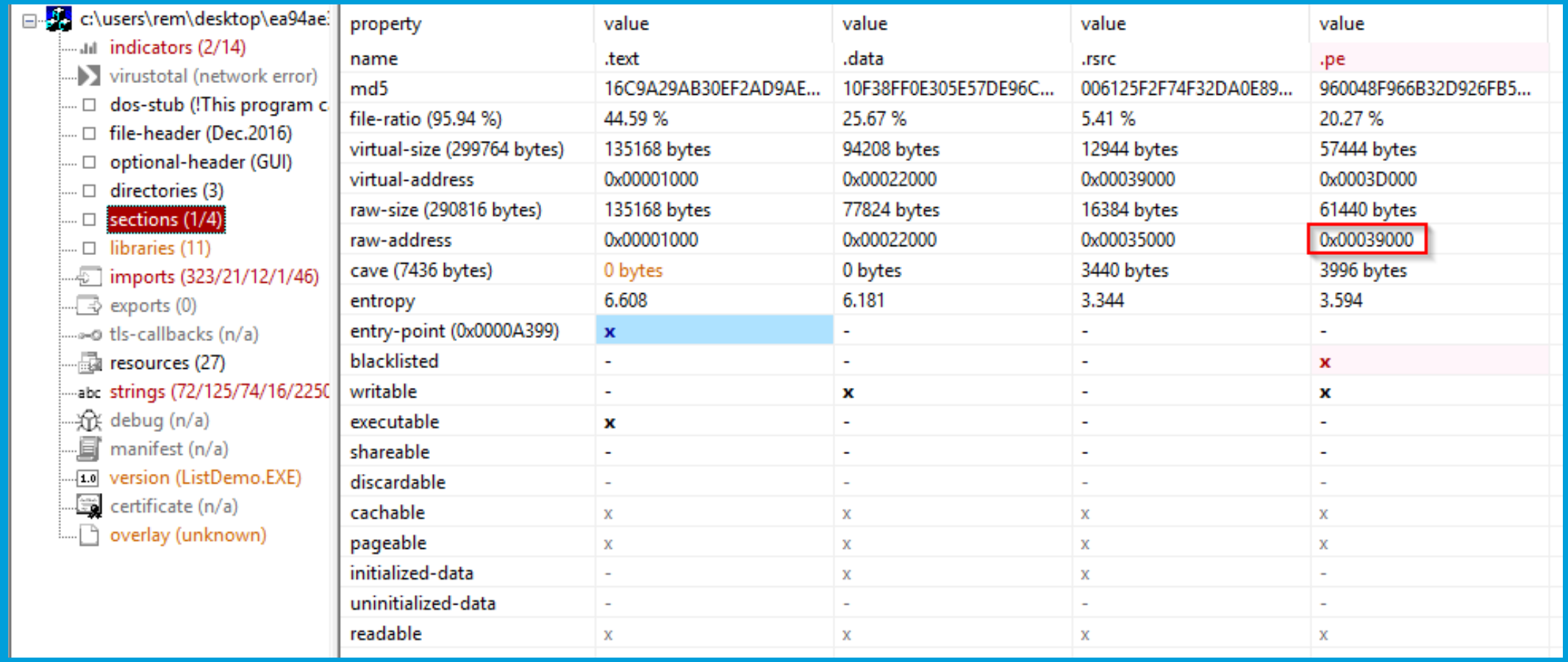
1: Intro
2: The Analysis
3: Questions

Forensicator, Malware analyst, SANS instructor, Cyclist, Private pilot

The start of the hunt

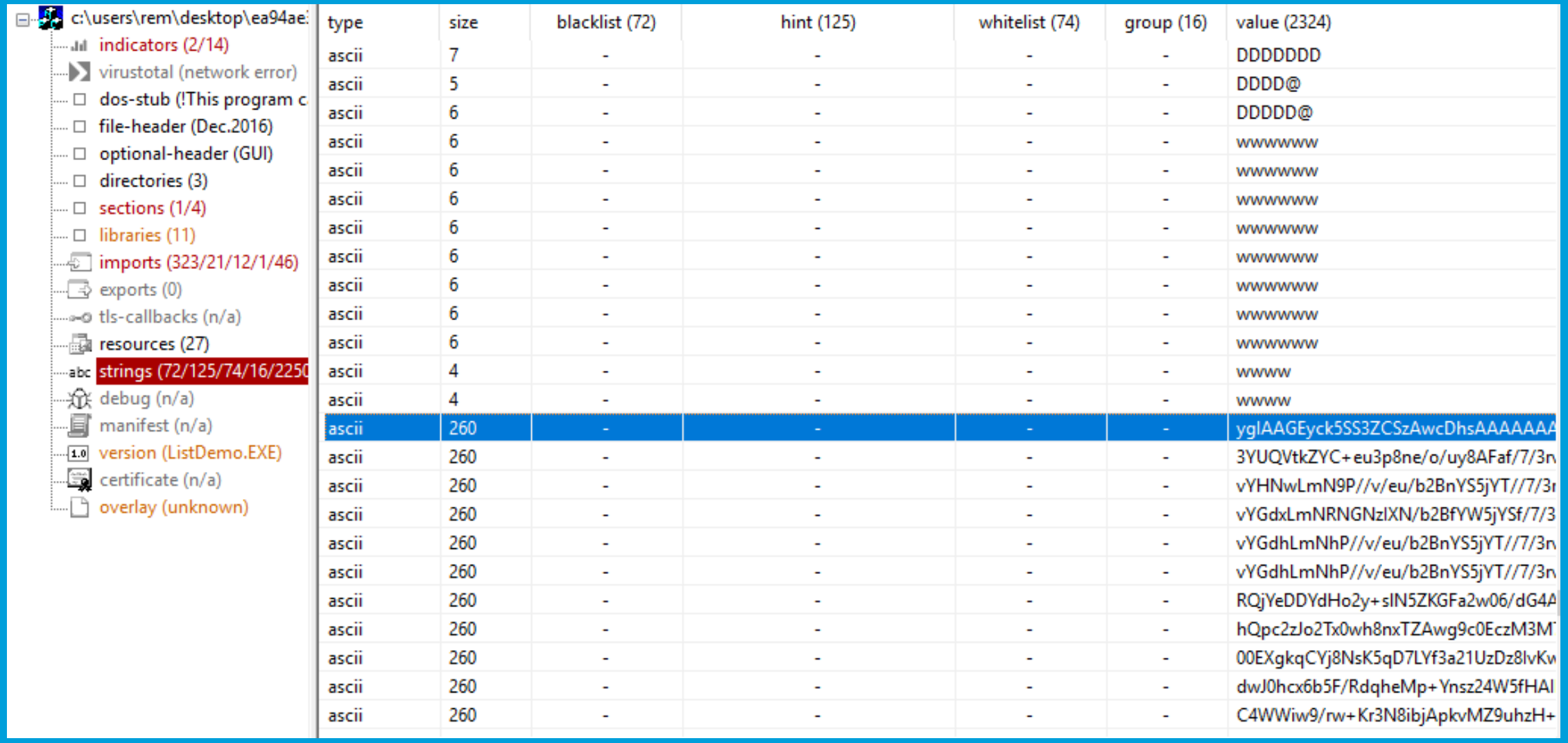
- Around Labor Day, nothing going on, needed to practice
- Was made aware of a couple of samples with new (to me) packer
- Several of us decided to look at it independently (nothing like a little competition within the team)

Preliminary exam



property	value	value	value	value
name	.text	.data	.rsrc	.pe
md5	16C9A29AB30EF2AD9AE...	10F38FF0E305E57DE96C...	006125F2F74F32DA0E89...	960048F966B32D926FB5...
file-ratio (95.94 %)	44.59 %	25.67 %	5.41 %	20.27 %
virtual-size (299764 bytes)	135168 bytes	94208 bytes	12944 bytes	57444 bytes
virtual-address	0x00001000	0x00022000	0x00039000	0x0003D000
raw-size (290816 bytes)	135168 bytes	77824 bytes	16384 bytes	61440 bytes
raw-address	0x00001000	0x00022000	0x00035000	0x00039000
cave (7436 bytes)	0 bytes	0 bytes	3440 bytes	3996 bytes
entropy	6.608	6.181	3.344	3.594
entry-point (0x0000A399)	x	-	-	-
blacklisted	-	-	-	x
writable	-	x	-	x
executable	x	-	-	-
shareable	-	-	-	-
discardable	-	-	-	-
cachable	x	x	x	x
pageable	x	x	x	x
initialized-data	-	x	x	-
uninitialized-data	-	-	-	-
readable	x	x	x	x

Preliminary exam, cont'd



type	size	blacklist (72)	hint (125)	whitelist (74)	group (16)	value (2324)
ascii	7	-	-	-	-	DDDDDDD
ascii	5	-	-	-	-	DDDD@
ascii	6	-	-	-	-	DDDDD@
ascii	6	-	-	-	-	wwwwww
ascii	6	-	-	-	-	wwwwww
ascii	6	-	-	-	-	wwwwww
ascii	6	-	-	-	-	wwwwww
ascii	6	-	-	-	-	wwwwww
ascii	6	-	-	-	-	wwwwww
ascii	6	-	-	-	-	wwwwww
ascii	6	-	-	-	-	wwwwww
ascii	4	-	-	-	-	wwww
ascii	4	-	-	-	-	wwww
ascii	260	-	-	-	-	yglAAGEyck5SS3ZCSzAwcDhsAAAAAAA
ascii	260	-	-	-	-	3YUQVtkZYC+eu3p8ne/o/uy8AFaf/7/3n
ascii	260	-	-	-	-	vYHNwLmN9P//v/eu/b2BnYS5jYT//7/3r
ascii	260	-	-	-	-	vYGdxLmNRNGNzlXN/b2BfYW5jYSf/7/3
ascii	260	-	-	-	-	vYGdhLmNhP//v/eu/b2BnYS5jYT//7/3n
ascii	260	-	-	-	-	vYGdhLmNhP//v/eu/b2BnYS5jYT//7/3n
ascii	260	-	-	-	-	RQjYeDDYdHo2y+sIN5ZKGFa2w06/dG4A
ascii	260	-	-	-	-	hQpc2zJo2Tx0wh8nxTZAwg9c0EczM3M
ascii	260	-	-	-	-	00EXgkqCYj8NsK5qD7LYf3a21UzDz8lvKv
ascii	260	-	-	-	-	dwJ0hcx6b5F/RdqheMp+Ynsz24W5fHAI
ascii	260	-	-	-	-	C4WWiw9/rw+Kr3N8ibjApkvMZ9uhzH+

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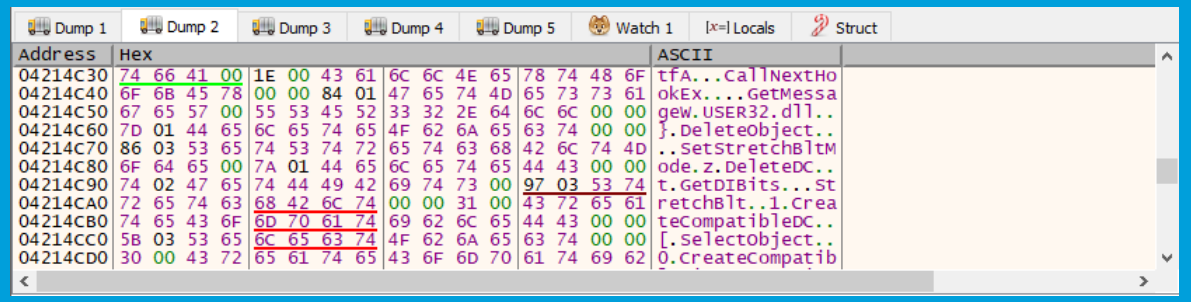
Static Code Analysis

- ListDemo.exe – code example
  - Extraneous functions
- Garbage code in actual unpacking routines
- Obviously obfuscated to make analysis difficult
- Moving on…

Unpack with the debugger



- Single-step
- Breakpoints on LoadLibraryA and GetProcAddress
- Try to find the jump to OEP

Try to dump it

Fail!!!

Regroup

c:\users\rem\desktop\ea94ae:
- indicators (2/14)
- virustotal (network error)
- dos-stub (!This program c
- file-header (Dec.2016)
- optional-header (GUI)
- directories (3)
- sections (1/4)
- libraries (11)
- imports (323/21/12/1/46)
- exports (0)
- tls-callbacks (n/a)
- resources (27)
- strings (72/125/74/16/225(
- debug (n/a)
- manifest (n/a)
- version (ListDemo.EXE)
- certificate (n/a)
- overlay (unknown)

property	value	value	value	value
name	.text	.data	.rsrc	.pe
md5	16C9A29AB30EF2AD9AE...	10F38FF0E305E57DE96C...	006125F2F74F32DA0E89...	960048F966B32D926FB5...
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discardable	-	-	-	-
cachable	x	x	x	x
pageable	x	x	x	x
initialized-data	-	x	x	-
uninitialized-data	-	-	-	-
readable	x	x	x	x

HxD - [C:\Users\REM\Desktop\EA94AE3CB4C86D1369CFD99E59D34D84D239F2C8 - Copy.exe]

File Edit Search View Analysis Extras Window ?

16 ANSI hex

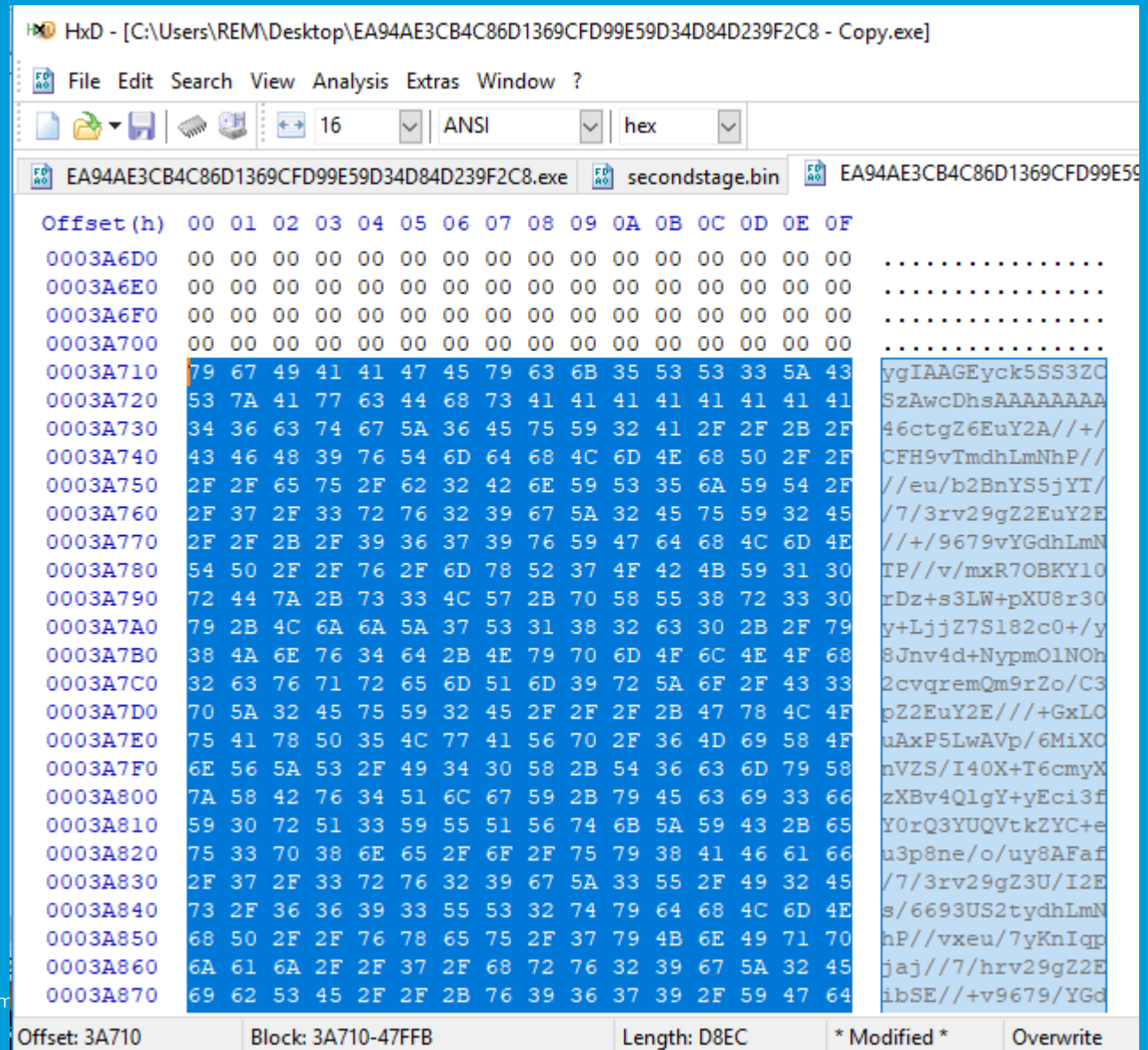
EA94AE3CB4C86D1369CFD99E59D34D84D239F2C8.exe secondstage.bin EA94AE3CB4C86D1369CFD99E5

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

00038FF0   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00039000   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00039010   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00039020   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00039030   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00039040   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00039050   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00039060   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00039070   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00039080   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00039090   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
000390A0   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
000390B0   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
000390C0   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
000390D0   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
000390E0   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
000390F0   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00039100   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00039110   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00039120   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00039130   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00039140   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00039150   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00039160   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00039170   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00039180   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00039190   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
```

Offset: 3A710 | Block: 3A710-47FFB | Length: D8EC | * Modified * | Overwrite

Hmm…



If at first, you don't succeed, try som

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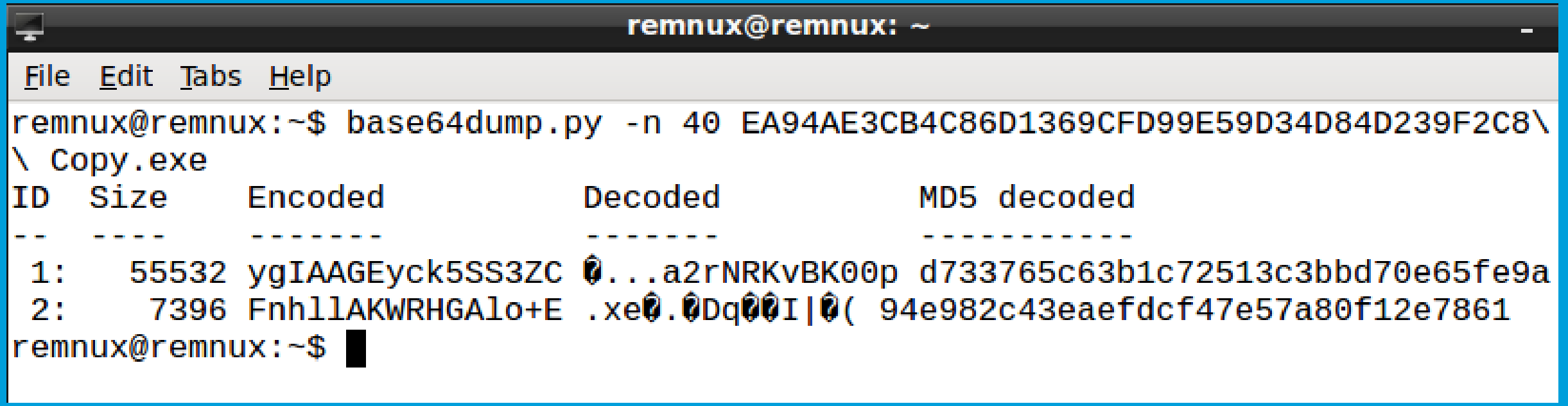
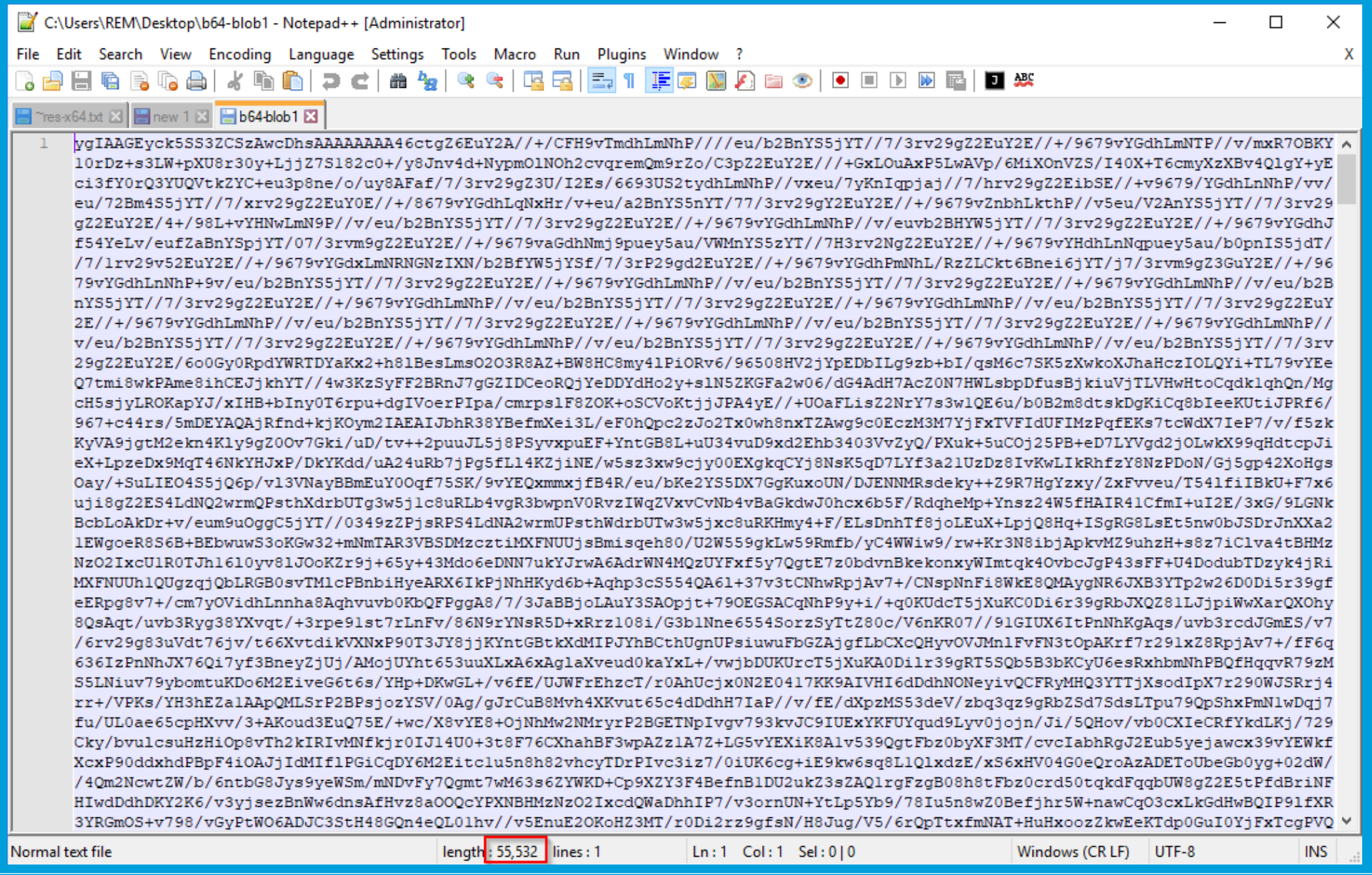
Those base64 strings look interesting




C:\Users\REM\Desktop\b64-blob1 - Notepad++ [Administrator]
File Edit Search View Encoding Language Settings Tools Macro Run Plugins Window ?
~res-x64.txt
new 1
b64-blob1
1
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f54YeLv/eufZaBnYSpjYT/07/3rvm9gZ2EuY2E//+/9679vaGdhNmj9puey5au/VWMnYS5zYT//7H3rv2NgZ2EuY2E//+/9679vYHdhLnNqpuey5au/b0pnIS5jdT/
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Normal text file
length : 55,532
lines : 1
Ln : 1 Col : 1 Sel : 0 | 0
Windows (CR LF)
UTF-8
INS

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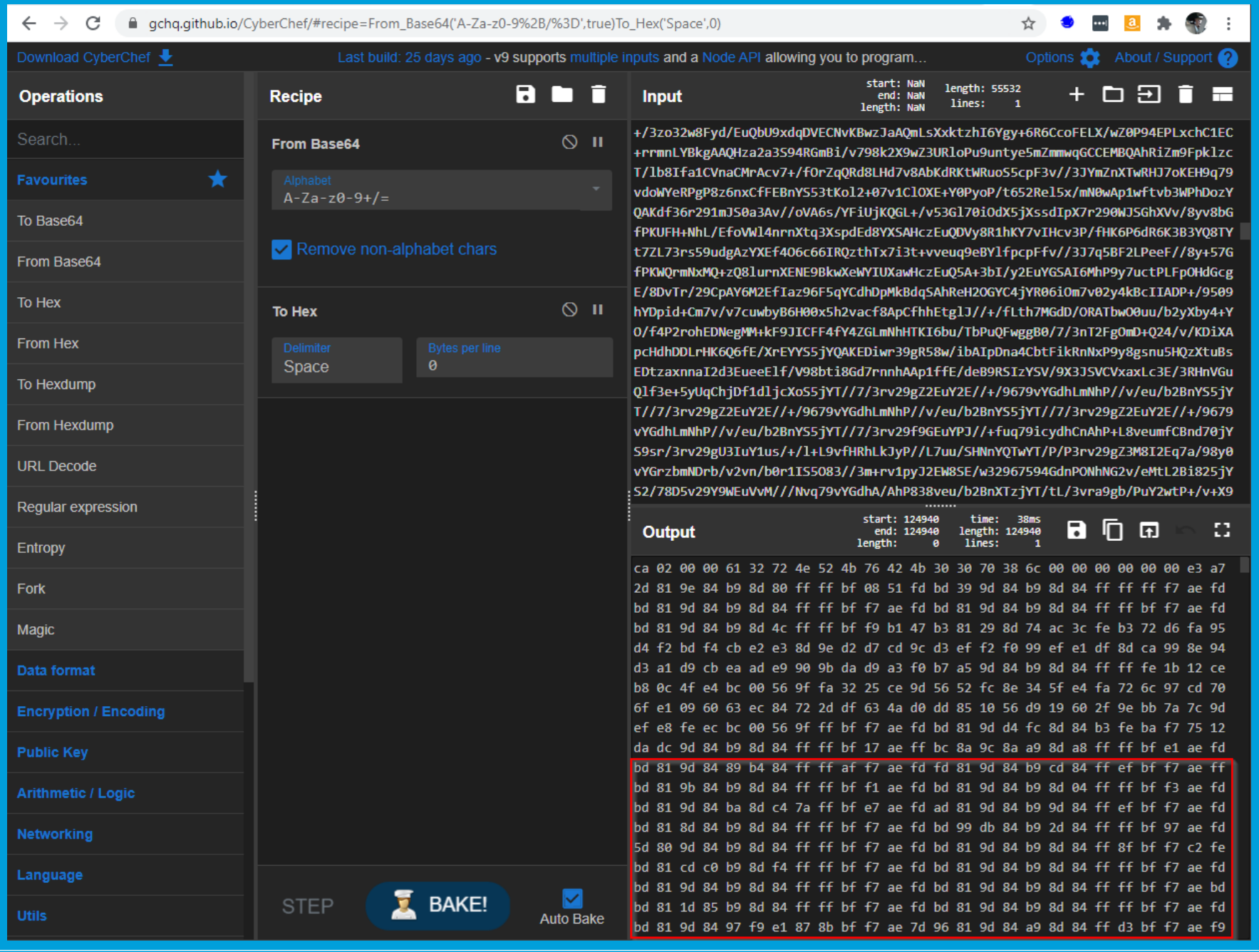
gchq.github.io/CyberChef/#recipe=From_Base64('A-Za-z0-9%2B/%3D',true)To_Hex('Space',0)
Download CyberChef
Last build: 25 days ago - v9 supports multiple inputs and a Node API allowing you to program...
Options
About / Support
Operations
Search...
Favourites
To Base64
From Base64
To Hex
From Hex
To Hexdump
From Hexdump
URL Decode
Regular expression
Entropy
Fork
Magic
Data format
Encryption / Encoding
Public Key
Arithmetic / Logic
Networking
Language
Utils
Recipe
From Base64
Alphabet
A-Za-z0-9+/=
Remove non-alphabet chars
To Hex
Delimiter
Space
Bytes per line
0
STEP
BAKE!
Auto Bake
Input
start: NaN
end: NaN
length: NaN
length: 55532
lines: 1
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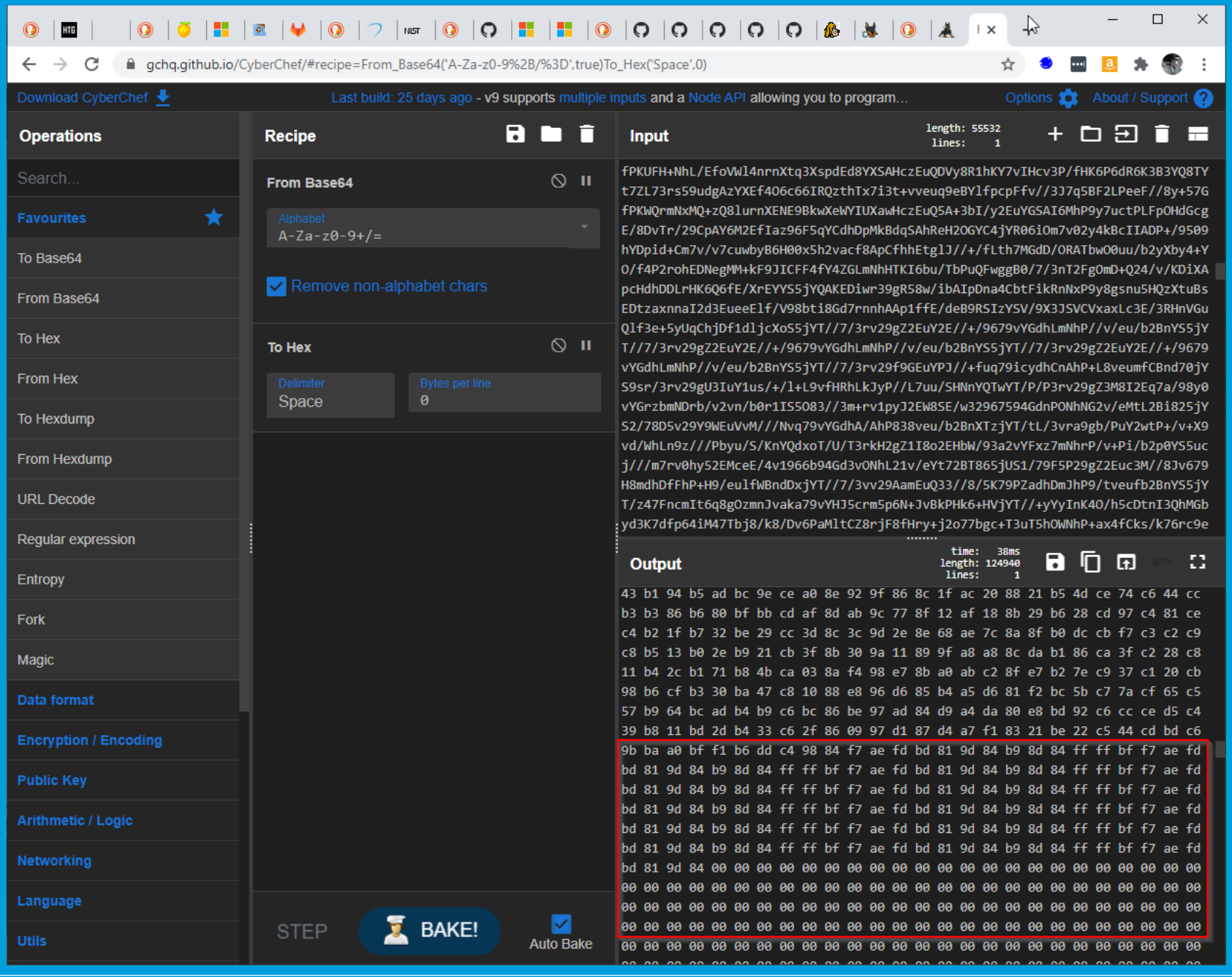
fPKWQrmNxMQ+zQ8lurnXENE9BkwXeWYIUXawHczEuQ5A+3bI/y2EuYGSAI6MhP9y7uctPLFpOHdGcg
E/8DvTr/29CpAY6M2EfIaz96F5qYCdhDpMkBdqSAhReH2OGYC4jYR06iOm7v02y4kBcIIADP+/9509
hYDpid+Cm7v/v7cuwbyB6H00x5h2vacf8ApCfhhEtglJ//+/fLth7MGdD/ORATbwO0uu/b2yXby4+Y
O/f4P2rohEDNegMM+kF9JICFF4fY4ZGLmNhHTKI6bu/TbPuQFwggB0/7/3nT2FgOmD+Q24/v/KDiXA
pcHdhDDLrHK6Q6fE/XrEYYS5jYQAKEDiwr39gR58w/ibAIpDna4CbtFikRnNxP9y8gsnu5HQzXtuBs
EDtzaxnnaI2d3EueeElf/V98bti8Gd7rnnhAAp1ffE/deB9RSIzYSV/9X3JSVCVxaxLc3E/3RHnVGu
Qlf3e+5yUqChjDf1dljcXoS5jYT//7/3rv29gZ2EuY2E//+/9679vYGdhLmNhP//v/eu/b2BnYS5jY
T//7/3rv29gZ2EuY2E//+/9679vYGdhLmNhP//v/eu/b2BnYS5jYT//7/3rv29gZ2EuY2E//+/9679
vYGdhLmNhP//v/eu/b2BnYS5jYT//7/3rv29f9GEuYPJ//+fuq79icydhCnAhP+L8veumfCBnd70jY
S9sr/3rv29gU3IuY1us/+/l+L9vfHRhLkJyP//L7uu/SHNnYQTwYT/P/P3rv29gZ3M8I2Eq7a/98y0
vYGrzbmNDrb/v2vn/b0r1IS5O83//3m+rv1pyJ2EW8SE/w32967594GdnPONhNG2v/eMtL2Bi825jY
S2/78D5v29Y9WEuVvM///Nvq79vYGdhA/AhP838veu/b2BnXTzjYT/tL/3vra9gb/PuY2wtP+/v+X9

Output
start: 124940
end: 124940
length: 0
time: 38ms
length: 124940
lines: 1
ca 02 00 00 61 32 72 4e 52 4b 76 42 4b 30 30 70 38 6c 00 00 00 00 00 00 e3 a7
2d 81 9e 84 b9 8d 80 ff ff bf 08 51 fd bd 39 9d 84 b9 8d 84 ff ff ff f7 ae fd
bd 81 9d 84 b9 8d 84 ff ff bf f7 ae fd bd 81 9d 84 b9 8d 84 ff ff bf f7 ae fd
bd 81 9d 84 b9 8d 4c ff ff bf f9 b1 47 b3 81 29 8d 74 ac 3c fe b3 72 d6 fa 95
d4 f2 bd f4 cb e2 e3 8d 9e d2 d7 cd 9c d3 ef f2 f0 99 ef e1 df 8d ca 99 8e 94
d3 a1 d9 cb ea ad e9 90 9b da d9 a3 f0 b7 a5 9d 84 b9 8d 84 ff ff fe 1b 12 ce
b8 0c 4f e4 bc 00 56 9f fa 32 25 ce 9d 56 52 fc 8e 34 5f e4 fa 72 6c 97 cd 70
6f e1 09 60 63 ec 84 72 2d df 63 4a d0 dd 85 10 56 d9 19 60 2f 9e bb 7a 7c 9d
ef e8 fe ec bc 00 56 9f ff bf f7 ae fd bd 81 9d d4 fc 8d 84 b3 fe ba f7 75 12
da dc 9d 84 b9 8d 84 ff ff bf 17 ae ff bc 8a 9c 8a a9 8d a8 ff ff bf e1 ae fd
bd 81 9d 84 89 b4 84 ff ff af f7 ae fd fd 81 9d 84 b9 cd 84 ff ef bf f7 ae ff
bd 81 9b 84 b9 8d 84 ff ff bf f1 ae fd bd 81 9d 84 b9 8d 04 ff ff bf f3 ae fd
bd 81 9d 84 ba 8d c4 7a ff bf e7 ae fd ad 81 9d 84 b9 9d 84 ff ef bf f7 ae fd
bd 81 8d 84 b9 8d 84 ff ff bf f7 ae fd bd 99 db 84 b9 2d 84 ff ff bf 97 ae fd
5d 80 9d 84 b9 8d 84 ff ff bf f7 ae fd bd 81 9d 84 b9 8d 84 ff 8f bf f7 c2 fe
bd 81 cd c0 b9 8d f4 ff ff bf f7 ae fd bd 81 9d 84 b9 8d 84 ff ff bf f7 ae fd
bd 81 9d 84 b9 8d 84 ff ff bf f7 ae fd bd 81 9d 84 b9 8d 84 ff ff bf f7 ae bd
bd 81 1d 85 b9 8d 84 ff ff bf f7 ae fd bd 81 9d 84 b9 8d 84 ff ff bf f7 ae fd
bd 81 9d 84 97 f9 e1 87 8b bf f7 ae 7d 96 81 9d 84 a9 8d 84 ff d3 bf f7 ae f9

AT&T

Lots of repetition, could there be a key in there

```
bd 81 9d 84 89 b4 84 ff ff af f7 ae fd fd 81 9d 84 b9 cd 84 ff ef bf f7 ae ff
bd 81 9b 84 b9 8d 84 ff ff bf f1 ae fd bd 81 9d 84 b9 8d 04 ff ff bf f3 ae fd
bd 81 9d 84 ba 8d c4 7a ff bf e7 ae fd ad 81 9d 84 b9 9d 84 ff ef bf f7 ae fd
bd 81 8d 84 b9 8d 84 ff ff bf f7 ae fd bd 99 db 84 b9 2d 84 ff ff bf 97 ae fd
5d 80 9d 84 b9 8d 84 ff ff bf f7 ae fd bd 81 9d 84 b9 8d 84 ff 8f bf f7 c2 fe
bd 81 cd c0 b9 8d f4 ff ff bf f7 ae fd bd 81 9d 84 b9 8d 84 ff ff bf f7 ae fd
bd 81 9d 84 b9 8d 84 ff ff bf f7 ae fd bd 81 9d 84 b9 8d 84 ff ff bf f7 ae bd
bd 81 1d 85 b9 8d 84 ff ff bf f7 ae fd bd 81 9d 84 b9 8d 84 ff ff bf f7 ae fd
bd 81 9d 84 97 f9 e1 87 8b bf f7 ae 7d 96 81 9d 84 a9 8d 84 ff d3 bf f7 ae f9
```

gchq.github.io/CyberChef/#recipe=From_Base64('A-Za-z0-9%2B/%3D',true)To_Hex('Space',0)

From Base64

Alphabet: A-Za-z0-9+/=

☑ Remove non-alphabet chars

To Hex

Delimiter: Space

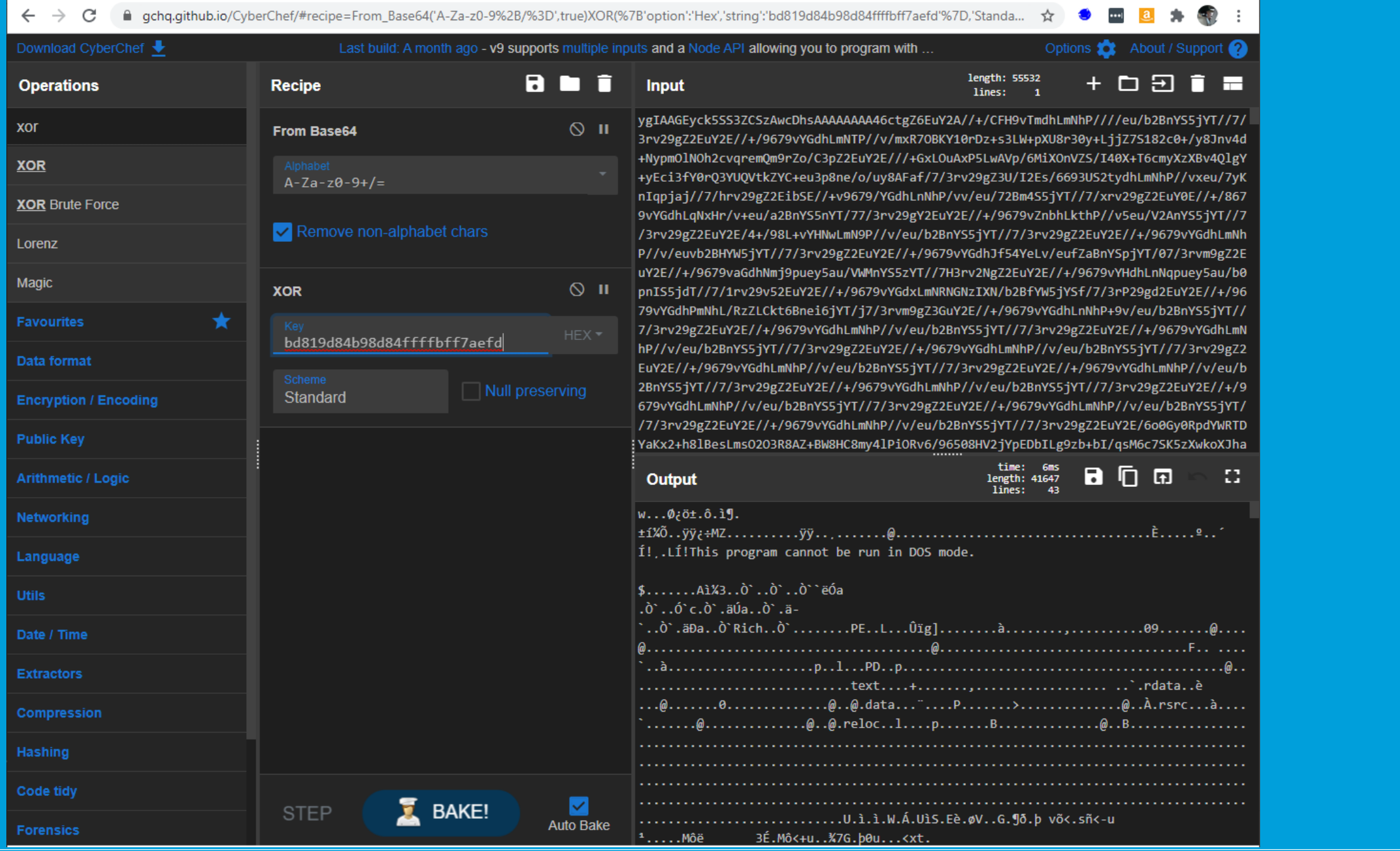
Bytes per line: 0

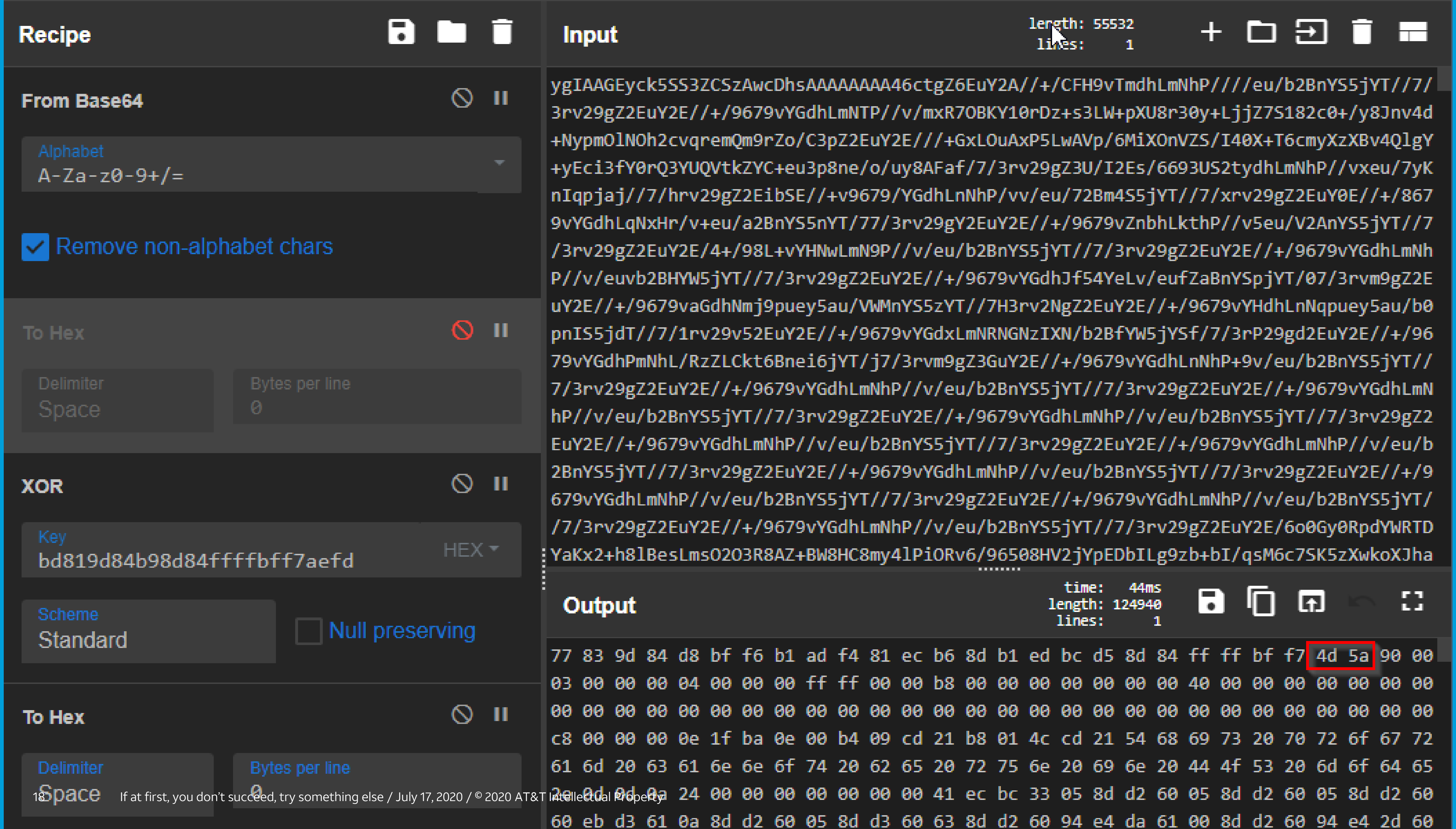
```
length: 55532
 lines:     1
```

```
fPKUFH+NhL/EfoVWl4nrnXtq3XspdEd8YXSAHczEuQDVy8R1hKY7vIHcv3P/fHK6P6dR6K3B3YQ8TY
t7ZL73rs59udgAzYXEf4O6c66IRQzthTx7i3t+vveuq9eBYlfpcpFfv//3J7q5BF2LPeeF//8y+57G
fPKWQrmNxMQ+zQ8lurnXENE9BkwXeWYIUXawHczEuQ5A+3bI/y2EuYGSAI6MhP9y7uctPLFpOHdGcg
E/8DvTr/29CpAY6M2EfIaz96F5qYCdhDpMkBdqSAhReH2OGYC4jYR06iOm7v02y4kBcIIADP+/9509
hYDpid+Cm7v/v7cuwbyB6H00x5h2vacf8ApCfhhEtglJ//+/fLth7MGdD/ORATbwO0uu/b2yXby4+Y
O/f4P2rohEDNegMM+kF9JICFF4fY4ZGLmNhHTKI6bu/TbPuQFwggB0/7/3nT2FgOmD+Q24/v/KDiXA
pcHdhDDLrHK6Q6fE/XrEYYS5jYQAKEDiwr39gR58w/ibAIpDna4CbtFikRnNxP9y8gsnu5HQzXtuBs
EDtzaxnnaI2d3EueeElf/V98bti8Gd7rnnhAAp1ffE/deB9RSIzYSV/9X3JSVCVxaxLc3E/3RHnVGu
Qlf3e+5yUqChjDf1dljcXoS5jYT//7/3rv29gZ2EuY2E//+/9679vYGdhLmNhP//v/eu/b2BnYS5jY
T//7/3rv29gZ2EuY2E//+/9679vYGdhLmNhP//v/eu/b2BnYS5jYT//7/3rv29gZ2EuY2E//+/9679
vYGdhLmNhP//v/eu/b2BnYS5jYT//7/3rv29f9GEuYPJ//+fuq79icydhCnAhP+L8veumfCBnd70jY
S9sr/3rv29gU3IuY1us/+/l+L9vfHRhLkJyP//L7uu/SHNnYQTwYT/P/P3rv29gZ3M8I2Eq7a/98y0
vYGrzbmNDrb/v2vn/b0r1IS5O83//3m+rv1pyJ2EW8SE/w32967594GdnPONhNG2v/eMtL2Bi825jY
S2/78D5v29Y9WEuVvM///Nvq79vYGdhA/AhP838veu/b2BnXTzjYT/tL/3vra9gb/PuY2wtP+/v+X9
vd/WhLn9z///Pbyu/S/KnYQdxoT/U/T3rkH2gZ1I8o2EHbW/93a2vYFxz7mNhrP/v+Pi/b2p0YS5uc
j///m7rv0hy52EMceE/4v1966b94Gd3vONhL21v/eYt72BT865jUS1/79F5P29gZ2Euc3M//8Jv679
H8mdhDfFhP+H9/eulfWBndDxjYT//7/3vv29AamEuQ33//8/5K79PZadhDmJhP9/tveufb2BnYS5jY
T/z47FncmIt6q8gOzmnJvaka79vYHJ5crm5p6N+JvBkPHk6+HVjYT//+yYyInK4O/h5cDtnI3QhMGb
yd3K7dfp64iM47Tbj8/k8/Dv6PaMltCZ8rjF8fHry+j2o77bgc+T3uT5hOWNhP+ax4fCks/k76rc9e
```

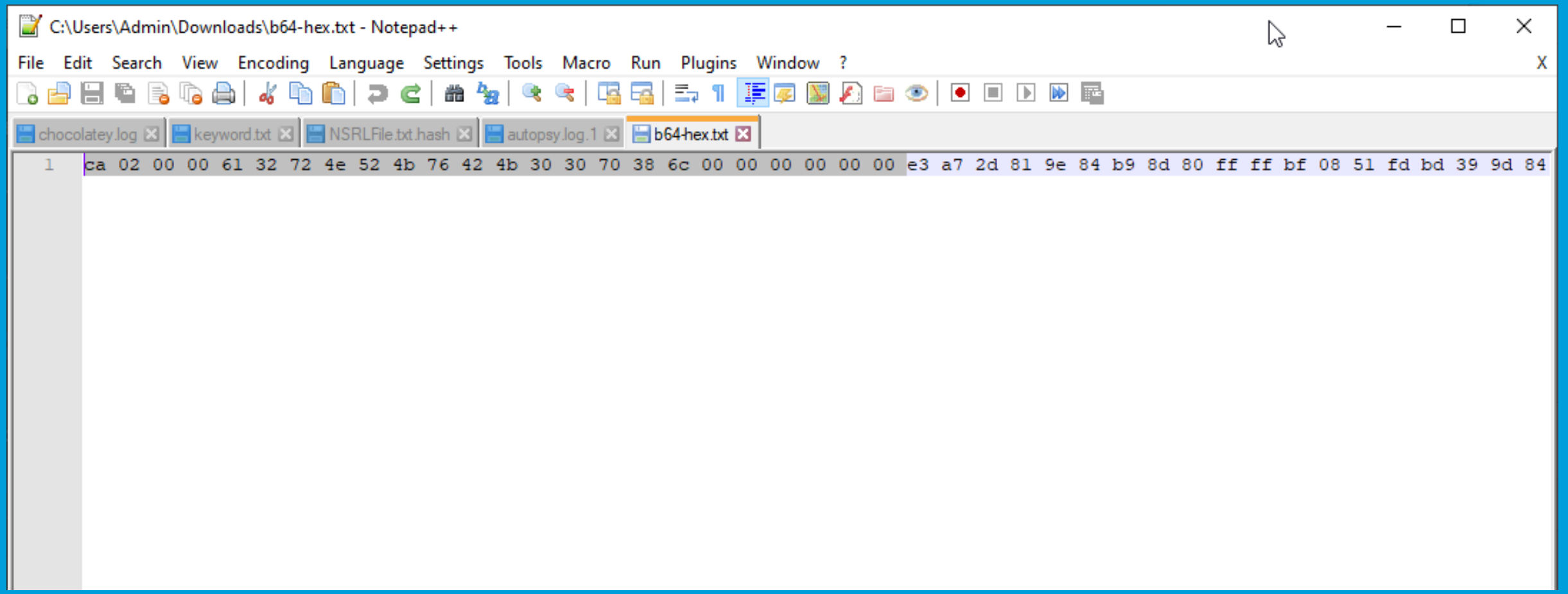
```
   time:   38ms
 length: 124940
  lines:      1
```

```
43 b1 94 b5 ad bc 9e ce a0 8e 92 9f 86 8c 1f ac 20 88 21 b5 4d ce 74 c6 44 cc
b3 b3 86 b6 80 bf bb cd af 8d ab 9c 77 8f 12 af 18 8b 29 b6 28 cd 97 c4 81 ce
c4 b2 1f b7 32 be 29 cc 3d 8c 3c 9d 2e 8e 68 ae 7c 8a 8f b0 dc cb f7 c3 c2 c9
c8 b5 13 b0 2e b9 21 cb 3f 8b 30 9a 11 89 9f a8 a8 8c da b1 86 ca 3f c2 28 c8
11 b4 2c b1 71 b8 4b ca 03 8a f4 98 e7 8b a0 ab c2 8f e7 b2 7e c9 37 c1 20 cb
98 b6 cf b3 30 ba 47 c8 10 88 e8 96 d6 85 b4 a5 d6 81 f2 bc 5b c7 7a cf 65 c5
57 b9 64 bc ad b4 b9 c6 bc 86 be 97 ad 84 d9 a4 da 80 e8 bd 92 c6 cc ce d5 c4
39 b8 11 bd 2d b4 33 c6 2f 86 09 97 d1 87 d4 a7 f1 83 21 be 22 c5 44 cd bd c6
9b ba a0 bf f1 b6 dd c4 98 84 f7 ae fd bd 81 9d 84 b9 8d 84 ff ff bf f7 ae fd
bd 81 9d 84 b9 8d 84 ff ff bf f7 ae fd bd 81 9d 84 b9 8d 84 ff ff bf f7 ae fd
bd 81 9d 84 b9 8d 84 ff ff bf f7 ae fd bd 81 9d 84 b9 8d 84 ff ff bf f7 ae fd
bd 81 9d 84 b9 8d 84 ff ff bf f7 ae fd bd 81 9d 84 b9 8d 84 ff ff bf f7 ae fd
bd 81 9d 84 b9 8d 84 ff ff bf f7 ae fd bd 81 9d 84 b9 8d 84 ff ff bf f7 ae fd
bd 81 9d 84 b9 8d 84 ff ff bf f7 ae fd bd 81 9d 84 b9 8d 84 ff ff bf f7 ae fd
bd 81 9d 84 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```


gchq.github.io/CyberChef/#recipe=From_Base64('A-Za-z0-9%2B/%3D',true)XOR(%7B'option':'Hex','string':'bd819d84b98d84ffffbff7aefd'%7D,'Standa...
Download CyberChef
Last build: A month ago - v9 supports multiple inputs and a Node API allowing you to program with ...
Options
About / Support
Operations
xor
XOR
XOR Brute Force
Lorenz
Magic
Favourites
Data format
Encryption / Encoding
Public Key
Arithmetic / Logic
Networking
Language
Utils
Date / Time
Extractors
Compression
Hashing
Code tidy
Forensics
Recipe
From Base64
Alphabet
A-Za-z0-9+/=
Remove non-alphabet chars
XOR
Key
bd819d84b98d84ffffbff7aefd
HEX
Scheme
Standard
Null preserving
STEP
BAKE!
Auto Bake
Input
length: 55532
lines: 1
ygIAAGEyck5SS3ZCSzAwcDhsAAAAAAAA46ctgZ6EuY2A//+/CFH9vTmdhLmNhP////eu/b2BnYS5jYT//7/
3rv29gZ2EuY2E//+/9679vYGdhLmNTP//v/mxR7OBKY10rDz+s3LW+pXU8r30y+LjjZ7S182c0+/y8Jnv4d
+NypmOlNOh2cvqremQm9rZo/C3pZ2EuY2E///+GxLOuAxP5LwAVp/6MiXOnVZS/I40X+T6cmyXzXBv4QlgY
+yEci3fY0rQ3YUQVtkZYC+eu3p8ne/o/uy8AFaf/7/3rv29gZ3U/I2Es/6693US2tydhLmNhP//vxeu/7yK
nIqpjaj//7/hrv29gZ2EibSE//+v9679/YGdhLnNhP/vv/eu/72Bm4S5jYT//7/xrv29gZ2EuY0E//+/867
9vYGdhLqNxHr/v+eu/a2BnYS5nYT/77/3rv29gY2EuY2E//+/9679vZnbhLkthP//v5eu/V2AnYS5jYT//7
/3rv29gZ2EuY2E/4+/98L+vYHNwLmN9P//v/eu/b2BnYS5jYT//7/3rv29gZ2EuY2E//+/9679vYGdhLmNh
P//v/euvb2BHYW5jYT//7/3rv29gZ2EuY2E//+/9679vYGdhJf54YeLv/eufZaBnYSpjYT/07/3rvm9gZ2E
uY2E//+/9679vaGdhNmj9puey5au/VwMnYS5zYT//7H3rv2NgZ2EuY2E//+/9679vYHdhLnNqpuey5au/b0
pnIS5jdT//7/1rv29v52EuY2E//+/9679vYGdxLmNRNGNzIXN/b2BfYW5jYSf/7/3rP29gd2EuY2E//+/96
79vYGdhPmNhL/RzZLCkt6Bnei6jYT/j7/3rvm9gZ3GuY2E//+/9679vYGdhLnNhP+9v/eu/b2BnYS5jYT//
7/3rv29gZ2EuY2E//+/9679vYGdhLmNhP//v/eu/b2BnYS5jYT//7/3rv29gZ2EuY2E//+/9679vYGdhLmN
hP//v/eu/b2BnYS5jYT//7/3rv29gZ2EuY2E//+/9679vYGdhLmNhP//v/eu/b2BnYS5jYT//7/3rv29gZ2
EuY2E//+/9679vYGdhLmNhP//v/eu/b2BnYS5jYT//7/3rv29gZ2EuY2E//+/9679vYGdhLmNhP//v/eu
/b2BnYS5jYT//7/3rv29gZ2EuY2E//+/9679vYGdhLmNhP//v/eu/b2BnYS5jYT//7/3rv29gZ2EuY2E//+
/9679vYGdhLmNhP//v/eu/b2BnYS5jYT//7/3rv29gZ2EuY2E//+/9679vYGdhLmNhP//v/eu/b2BnYS5jYT/
/7/3rv29gZ2EuY2E//+/9679vYGdhLmNhP//v/eu/b2BnYS5jYT//7/3rv29gZ2EuY2E6o0Gy0RpdYWRTD
YaKx2+h8lBesLmsO2O3R8AZ+BW8HC8my4lPiORv6/96508HV2jYpEDbILg9zb+bI/qsM6c7SK5zXwkoXJha
Output
time: 6ms
length: 41647
lines: 43
w...Ø¿ö±.ô.ì¶.
±í¾Õ..ÿÿ¿÷MZ.....ÿÿ..¸.....@.....È....º..´
Í!¸.LÍ!This program cannot be run in DOS mode.
$.....Aì¾3..Ò`..Ò`..Ò``ëÓa
.Ò`..Ó`c.Ò`.äÚa..Ò`.ã-
`..Ò`.äÐa..Ò`Rich..Ò`.....PE..L...Ûïg].....à.....,.....09.....@....
@.....@.....F.. ....
`..à.....p..l...PD..p.....@..
.....text....+.....,..... ..`.rdata..è
...@.....0.....@..@.data...¨....P.....>.....@..À.rsrc...à....
`.....@.....@..@.reloc..l....p.....B.....@..B.....
.....U.ì.ì.W.Á.UìS.Eè.øV..G.¶ð.þ võ<.sñ<-u
¹.....Mõë 3É.Mô<+u..¾7G.þ0u...<xt.


Recipe
From Base64
Alphabet
A-Za-z0-9+/=
Remove non-alphabet chars
To Hex
Delimiter
Space
Bytes per line
0
XOR
Key
bd819d84b98d84ffffbff7aefd
HEX
Scheme
Standard
Null preserving
To Hex
Delimiter
Space
Bytes per line
0
Input
length: 55532
lines: 1
ygIAAGEyck5SS3ZCSzAwcDhsAAAAAAAA46ctgZ6EuY2A//+/CFH9vTmdhLmNhP////eu/b2BnYS5jYT//7/
3rv29gZ2EuY2E//+/9679vYGdhLmNTP//v/mxR7OBKY10rDz+s3LW+pXU8r30y+LjjZ7S182c0+/y8Jnv4d
+NypmOlNOh2cvqremQm9rZo/C3pZ2EuY2E///+GxLOuAxP5LwAVp/6MiXOnVZS/I40X+T6cmyXzXBv4QlgY
+yEci3fY0rQ3YUQVtkZYC+eu3p8ne/o/uy8AFaf/7/3rv29gZ3U/I2Es/6693US2tydhLmNhP//vxeu/7yK
nIqpjaj//7/hrv29gZ2EibSE//+v9679/YGdhLnNhP/vv/eu/72Bm4S5jYT//7/xrv29gZ2EuY0E//+/867
9vYGdhLqNxHr/v+eu/a2BnYS5nYT/77/3rv29gY2EuY2E//+/9679vZnbhLkthP//v5eu/V2AnYS5jYT//7
/3rv29gZ2EuY2E/4+/98L+vYHNwLmN9P//v/eu/b2BnYS5jYT//7/3rv29gZ2EuY2E//+/9679vYGdhLmNh
P//v/euvb2BHYW5jYT//7/3rv29gZ2EuY2E//+/9679vYGdhJf54YeLv/eufZaBnYSpjYT/07/3rvm9gZ2E
uY2E//+/9679vaGdhNmj9puey5au/VWMnYS5zYT//7H3rv2NgZ2EuY2E//+/9679vYHdhLnNqpuey5au/b0
pnIS5jdT//7/1rv29v52EuY2E//+/9679vYGdxLmNRNGNzIXN/b2BfYW5jYSf/7/3rP29gd2EuY2E//+/96
79vYGdhPmNhL/RzZLCkt6Bnei6jYT/j7/3rvm9gZ3GuY2E//+/9679vYGdhLnNhP+9v/eu/b2BnYS5jYT//
7/3rv29gZ2EuY2E//+/9679vYGdhLmNhP//v/eu/b2BnYS5jYT//7/3rv29gZ2EuY2E//+/9679vYGdhLmN
hP//v/eu/b2BnYS5jYT//7/3rv29gZ2EuY2E//+/9679vYGdhLmNhP//v/eu/b2BnYS5jYT//7/3rv29gZ2
EuY2E//+/9679vYGdhLmNhP//v/eu/b2BnYS5jYT//7/3rv29gZ2EuY2E//+/9679vYGdhLmNhP//v/eu/b
2BnYS5jYT//7/3rv29gZ2EuY2E//+/9679vYGdhLmNhP//v/eu/b2BnYS5jYT//7/3rv29gZ2EuY2E//+/9
679vYGdhLmNhP//v/eu/b2BnYS5jYT//7/3rv29gZ2EuY2E//+/9679vYGdhLmNhP//v/eu/b2BnYS5jYT/
/7/3rv29gZ2EuY2E//+/9679vYGdhLmNhP//v/eu/b2BnYS5jYT//7/3rv29gZ2EuY2E/6o0Gy0RpdYWRTD
YaKx2+h8lBesLmsO2O3R8AZ+BW8HC8my41PiORv6/96508HV2jYpEDbILg9zb+bI/qsM6c7SK5zXwkoXJha
Output
time: 44ms
length: 124940
lines: 1
77 83 9d 84 d8 bf f6 b1 ad f4 81 ec b6 8d b1 ed bc d5 8d 84 ff ff bf f7 4d 5a 90 00
03 00 00 00 04 00 00 00 ff ff 00 00 b8 00 00 00 00 00 00 00 40 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
c8 00 00 00 0e 1f ba 0e 00 b4 09 cd 21 b8 01 4c cd 21 54 68 69 73 20 70 72 6f 67 72
61 6d 20 63 61 6e 6e 6f 74 20 62 65 20 72 75 6e 20 69 6e 20 44 4f 53 20 6d 6f 64 65
2e 0d 0d 0a 24 00 00 00 00 00 00 00 41 ec bc 33 05 8d d2 60 05 8d d2 60 05 8d d2 60
60 eb d3 61 0a 8d d2 60 05 8d d3 60 63 8d d2 60 94 e4 da 61 00 8d d2 60 94 e4 2d 60

Do a little editing of the un-XOR-ed hex



Recipe

From Base64

Alphabet
A-Za-z0-9+/=

Remove non-alphabet chars

To Hex

Delimiter
Space

Bytes per line
0

From Hex

Delimiter
Auto

XOR

Key
aefdbd819d84b98d84ffffbff7

HEX

Scheme
Standard

Null preserving

Input

length: 124868
lines: 1

```
e3 a7 2d 81 9e 84 b9 8d 80 ff ff bf 08 51 fd bd 39 9d 84 b9 8d 84 ff ff ff f7 ae fd
bd 81 9d 84 b9 8d 84 ff ff bf f7 ae fd bd 81 9d 84 b9 8d 84 ff ff bf f7 ae fd bd 81
9d 84 b9 8d 4c ff ff bf f9 b1 47 b3 81 29 8d 74 ac 3c fe b3 72 d6 fa 95 d4 f2 bd f4
cb e2 e3 8d 9e d2 d7 cd 9c d3 ef f2 f0 99 ef e1 df 8d ca 99 8e 94 d3 a1 d9 cb ea ad
e9 90 9b da d9 a3 f0 b7 a5 9d 84 b9 8d 84 ff ff fe 1b 12 ce b8 0c 4f e4 bc 00 56 9f
fa 32 25 ce 9d 56 52 fc 8e 34 5f e4 fa 72 6c 97 cd 70 6f e1 09 60 63 ec 84 72 2d df
63 4a d0 dd 85 10 56 d9 19 60 2f 9e bb 7a 7c 9d ef e8 fe ec bc 00 56 9f ff bf f7 ae
fd bd 81 9d d4 fc 8d 84 b3 fe ba f7 75 12 da dc 9d 84 b9 8d 84 ff ff bf 17 ae ff bc
8a 9c 8a a9 8d a8 ff ff bf e1 ae fd bd 81 9d 84 89 b4 84 ff ff af f7 ae fd fd 81 9d
84 b9 cd 84 ff ef bf f7 ae ff bd 81 9b 84 b9 8d 84 ff ff bf f1 ae fd bd 81 9d 84 b9
8d 04 ff ff bf f3 ae fd bd 81 9d 84 ba 8d c4 7a ff bf e7 ae fd ad 81 9d 84 b9 9d 84
ff ef bf f7 ae fd bd 81 8d 84 b9 8d 84 ff ff bf f7 ae fd bd 99 db 84 b9 2d 84 ff ff
bf 97 ae fd 5d 80 9d 84 b9 8d 84 ff ff bf f7 ae fd bd 81 9d 84 b9 8d 84 ff 8f bf f7
c2 fe bd 81 cd c0 b9 8d f4 ff ff bf f7 ae fd bd 81 9d 84 b9 8d 84 ff ff bf f7 ae fd
bd 81 9d 84 b9 8d 84 ff ff bf f7 ae fd bd 81 9d 84 b9 8d 84 ff ff bf f7 ae bd bd 81
1d 85 b9 8d 84 ff ff bf f7 ae fd bd 81 9d 84 b9 8d 84 ff ff bf f7 ae fd bd 81 9d 84
97 f9 e1 87 8b bf f7 ae 7d 96 81 9d 84 a9 8d 84 ff d3 bf f7 ae f9 bd 81 9d 84 b9 8d
84 ff ff bf f7 ae fd bd a1 9d 84 d9 a3 f6 9b 9e cb 96 ae fd 55 8c 9d 84 b9 cd 84 ff
```

Output

time: 17ms
length: 41623
lines: 43

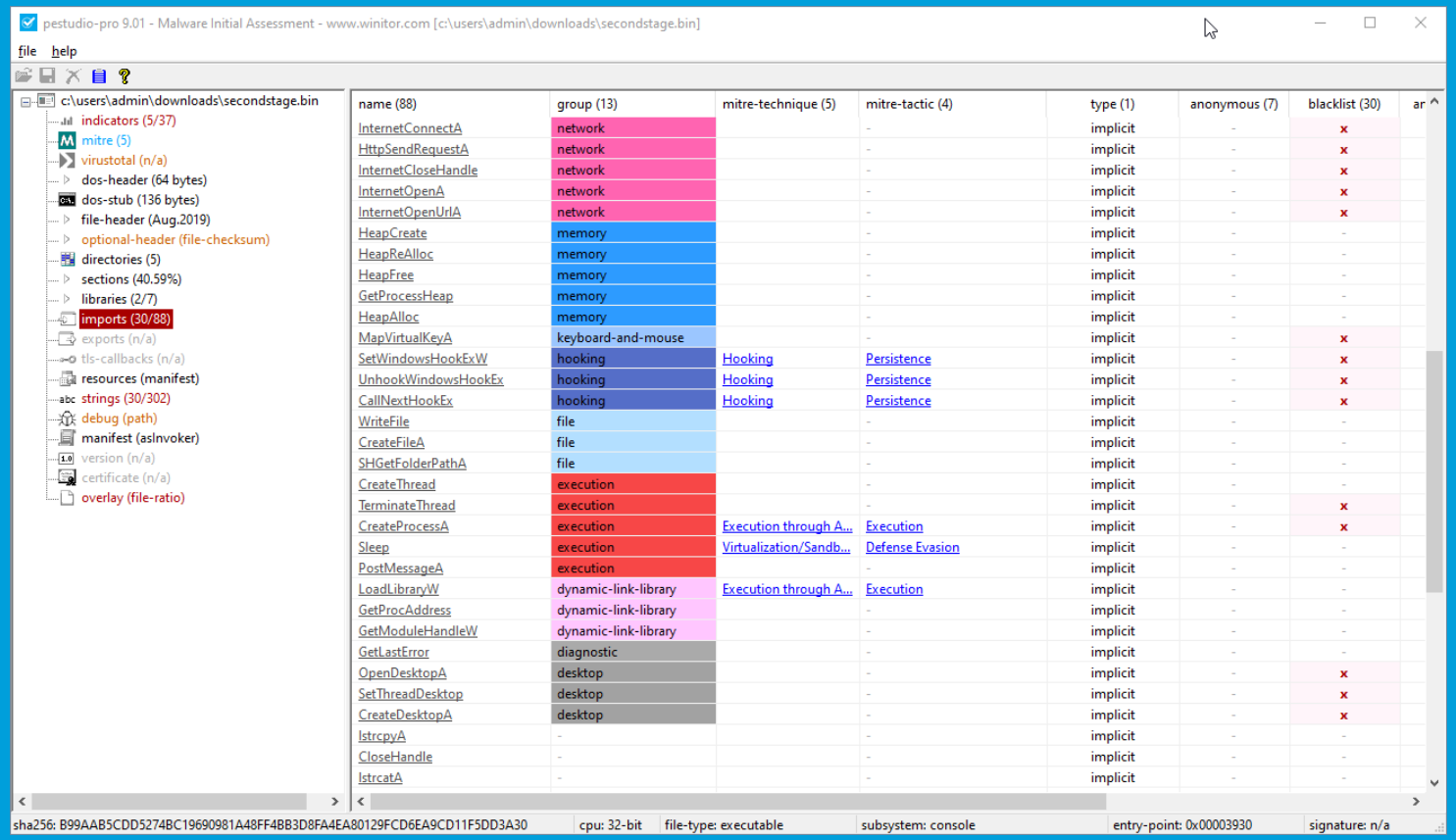
```
MZ.....ÿÿ..,.....@.....È.....º..´ Í!¸.LÍ!This
program cannot be run in DOS mode.

$.....Aì¼3..Ò`..Ò`..Ò``ëÓa
 Ò`..Ó`c Ò`.äÚa..Ò`.ã-
`..Ò`.äÐa..Ò`Rich..Ò`.....PE..L...Ûïg].....à.....,.....09.....@....
```

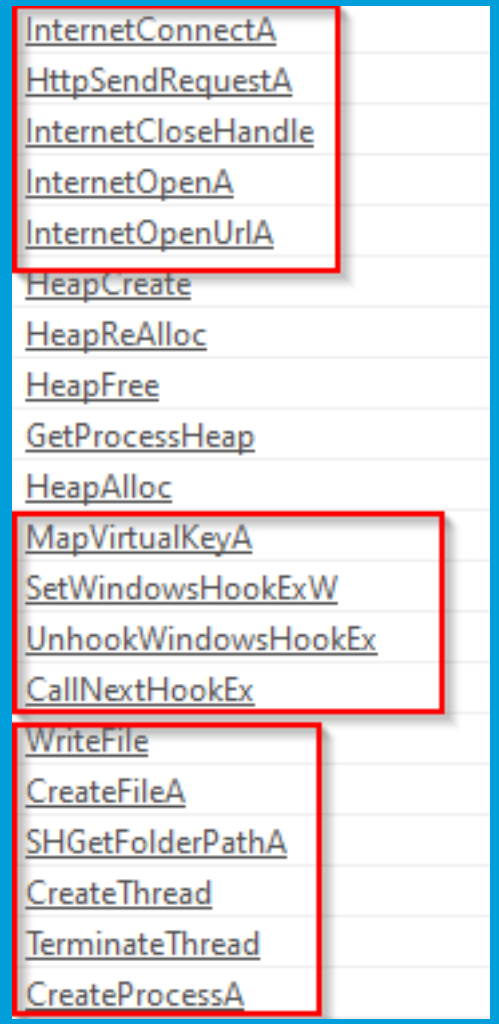

Interesting Strings/IOCs

```
POST
explorer.exe
Mozilla/5.0 (Windows NT 6.1; Win64; x64; rv:47.0) Gecko/20100101 Firefox/47.0
51.81.9.201
Software\Microsoft\Windows\CurrentVersion\Explorer\Advanced
Admin
/test2/gateway.php
filename.exe
C:\Users\Dhillon\Desktop\Waifu's Work\Release\Waifu's Work.pdb
```

```
5|@@
h D@
F.QP
5X@@
0123456789abcdef
TaskbarGlomLevel
Shell_TrayWnd
\rundll32.exe shell32.dll,#61
Button
```


Looks like a key logger





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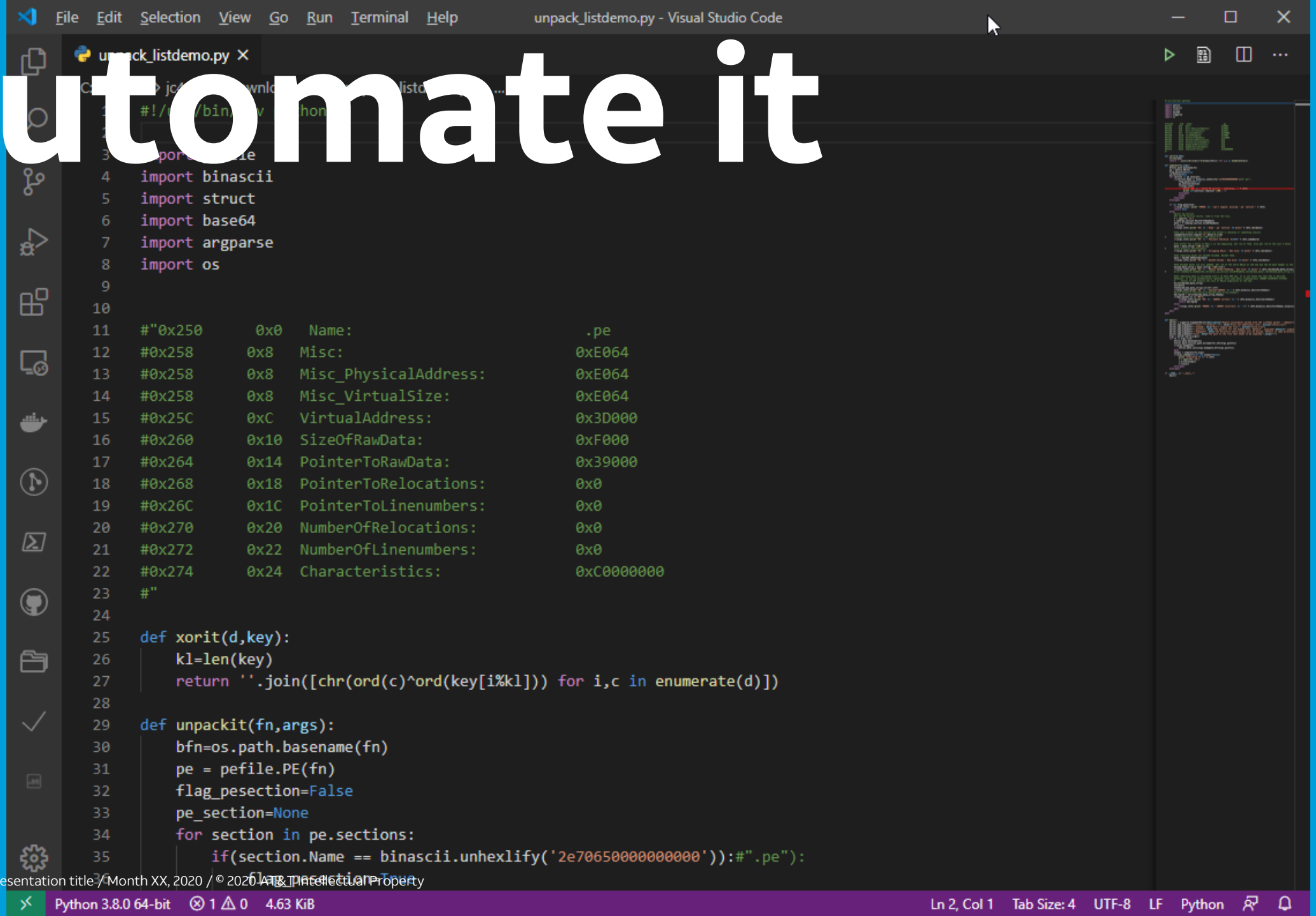
Automate it



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Conclusions

Questions?

References:

- https://github.com/att/docker-forensics/blob/master/unpack_listdemo.py

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Thanks for attending