Forensics Report and Documentation

Case 001 The Case of the Stolen Szechuan Sauce

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The Stolen Szechuan Sauce [image courtesy of artwork-tee]

Executive Summary

A digital forensics investigation was conducted to understand a cyber security incident involving the theft of confidential data. The scenario, created by DFIR Madness, focused on a compromised server and desktop.

Our investigation confirmed a system breach targeting sensitive data. Evidence suggests a brute-force RDP attack, like Morty teleporting into the wrong dimension. Malicious software (coreupdater.exe) was identified lurking on both machines, downloaded from a suspicious IP address. This malware established persistence mechanisms and has functionalities for compromising security, reconnaissance, and potentially manipulating data. The attacker infiltrated the network, potentially stealing the Szechuan Sauce recipe! Further investigation is necessary to determine if the sauce was stolen and its impact on world C-137.

We recommend a network security assessment to identify and address RDP vulnerabilities. Additionally, implementing stronger RDP authentication methods can help prevent similar attacks in the future. This incident underscores the importance of robust cyber security measures to mitigate such risks, otherwise you might find yourself in a sticky situation, with your sauce hostage.

Questions

1. What's the Operating System of the Server? (Dan and Heather)

To find the answer we used Volatility software on our Linux machine to examine the memory file citadeldc01.mem. In order to extract the information needed we used the command terminal and imputed <volatility -f citadeldc01.mem imageinfo> (Figure 1).

Answer: Windows Server 2012 - Win2012R2x64

```
user@user-pc:~/Desktop/Case001$ volatility -f citadeldc01.mem imageinfo
Volatility Foundation Volatility Framework 2.6.1
INFO    : volatility.debug    : Determining profile based on KDBG search...
          Suggested Profile(s) : Win8SP0x64, Win81U1x64, Win2012R2x64_18340, Win2012R2x64, Win2012x64, Win8SP1x6
4_18340, Win8SP1x64
                     AS Layer1 : SkipDuplicatesAMD64PagedMemory (Kernel AS)
                     AS Layer2 : FileAddressSpace (/home/user/Desktop/Case001/citadeldc01.mem)
                      PAE type : No PAE
                           DTB : 0x1a7000L
                          KDBG : 0xf800cba9ba20L
          Number of Processors : 2
     Image Type (Service Pack) : 0
                KPCR for CPU 0 : 0xfffff800cbaea000L
                KPCR for CPU 1 : 0xffffd0019fd55000L
             KUSER_SHARED_DATA : 0xffffff78000000000L
           Image date and time : 2020-09-19 04:39:59 UTC+0000
     Image local date and time : 2020-09-18 21:39:59 -0700
user@user-pc:~/Desktop/Case001$
```

Figure 1

2. What's the Operating System of the Desktop? (Dan and Heather)

To find the answer we used Volatility software on our Linux machine to examine the memory file citadeldc01.mem. In order to extract the information needed we used the command terminal and imputed <volatility -f citadeldc01.mem imageinfo> (Figure 1)

Answer: Microsoft Windows Win8SPOx64, Win81U1x64

3. What was the local time of the Server? (Dan and Heather)

To find the answer we used Volatility software on our Linux machine to examine the memory file citadeldc01.mem. In order to extract the information needed we used the command terminal and imputed <volatility -f citadeldc01.mem imageinfo> (Figure 1)

Answer: 2020-09-18 21:39:59 -0700

4. Was there a breach? (Dan and Heather)

Answer: Yes. We know from the summary the recipe was stolen.

5. What was the initial entry vector (how did they get in)? (Dan and Heather)

Wireshark was our ally during this phase, from the captures we could see how they got in and what method they used. (Figure 2)

Answer: Remote Desktop Brute Force

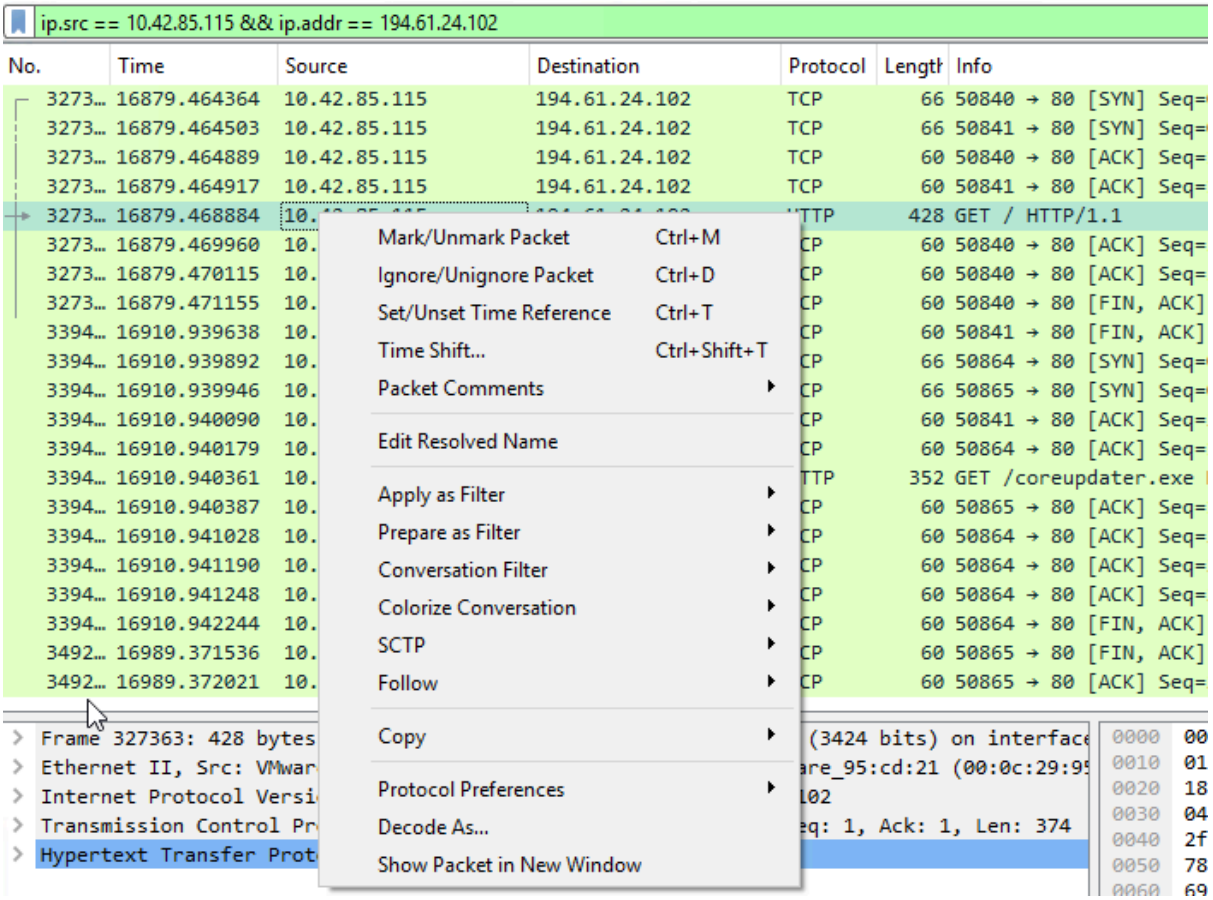


Figure 2

From the screenshot above (Figure 2) we right-clicked the GET request and used “Follow” protocol action which resulted in the below screenshot (Figure 3). This confirms access to the system.

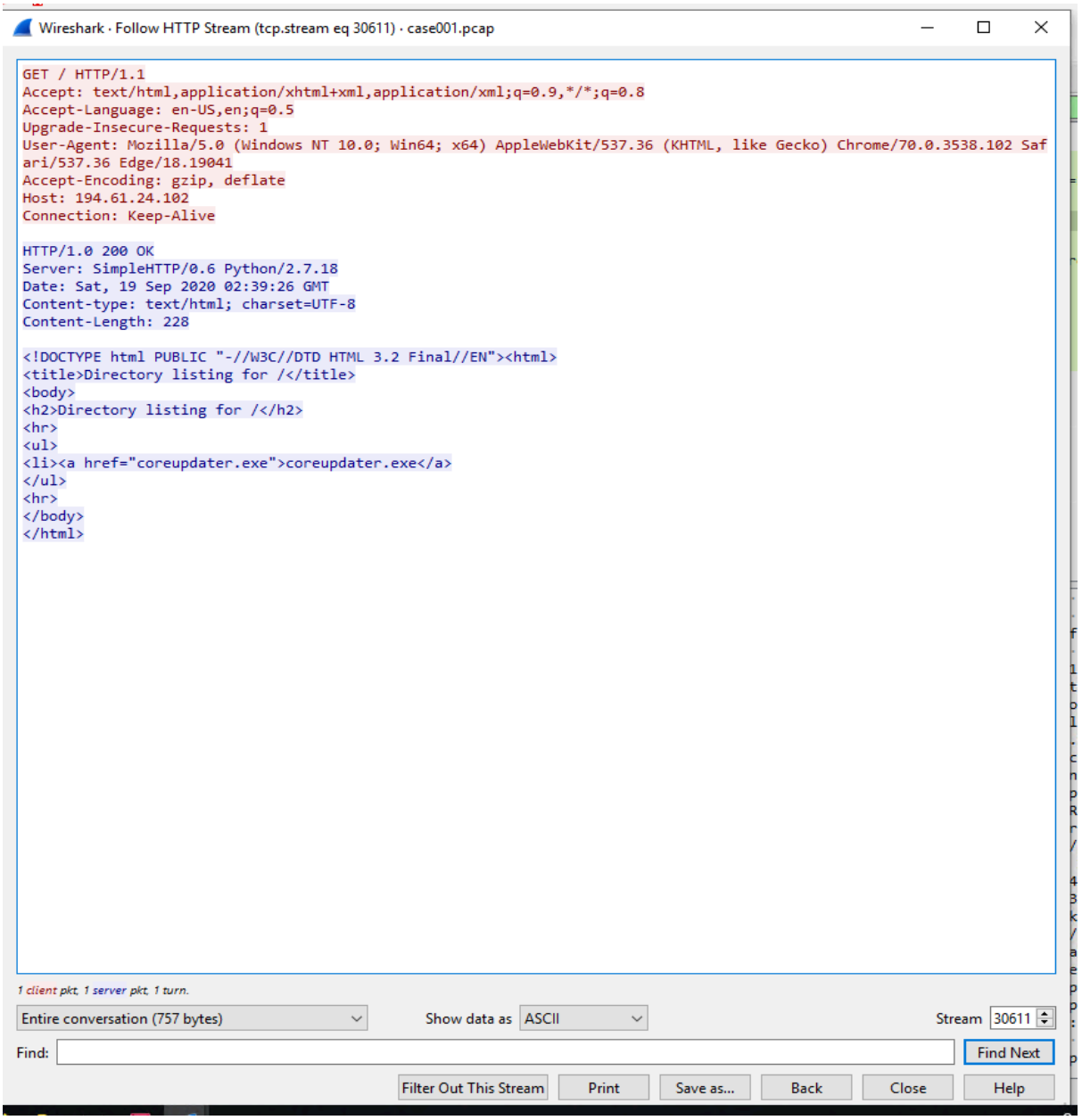


Figure 3

Filtering the 192.61.24.102 IP we can determine the different packets that uploaded the coreupdater.exe file (Figure 4).

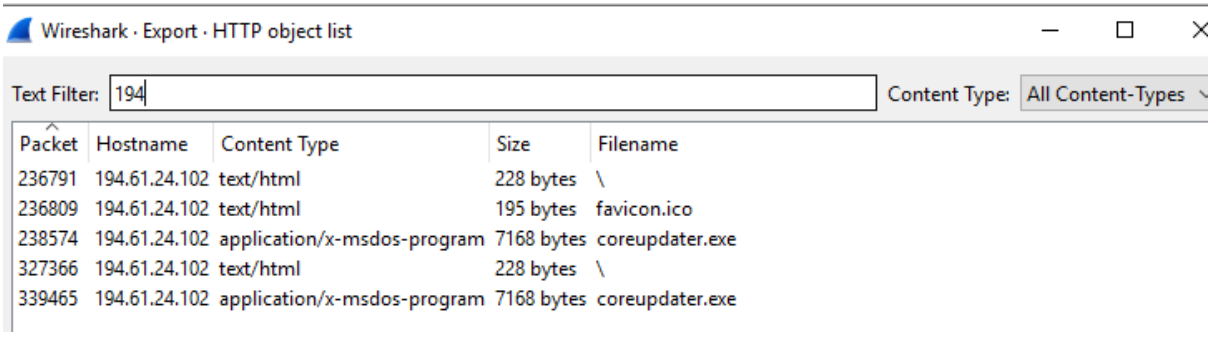


Figure 4

6. Was malware used? If so, what was it? If there was malware answer the following: (Dan and Heather)

In order to find all the information below we utililized our Linux machine to get IP addresses, PID, and Ports through a netscan and pull the files out into a more easily read file with the argument netscan.out. We also entered the hash values from the autorun csv file in VirusTotal to gather the rest of the information.

6a. What process was malicious?

Answer: 3644 (Figure 5)

Figure 5

6b. Identify the IP Address that delivered the payload

Searching with Ctrl+F we can search for the suspicious PID 3644 (Figures 7, 8). We notice there are two successful connection establishments through TCPv4 and the implicated IP. This was associated with the coreupdater.ex file.

Answer: 203.78.103.109 through Port 443.

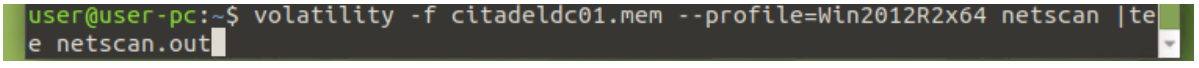


Figure 6

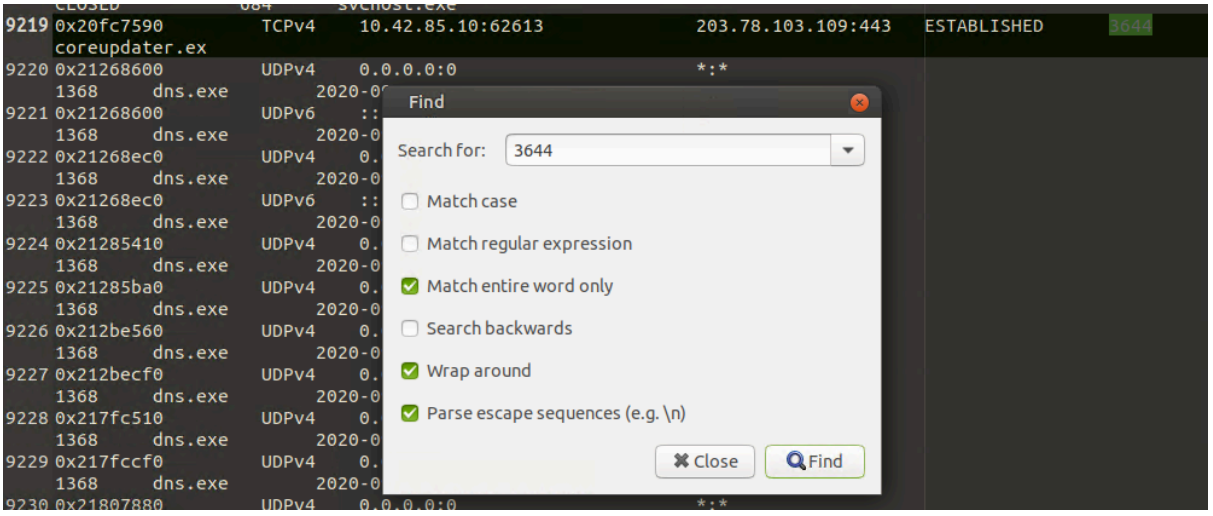


Figure 7

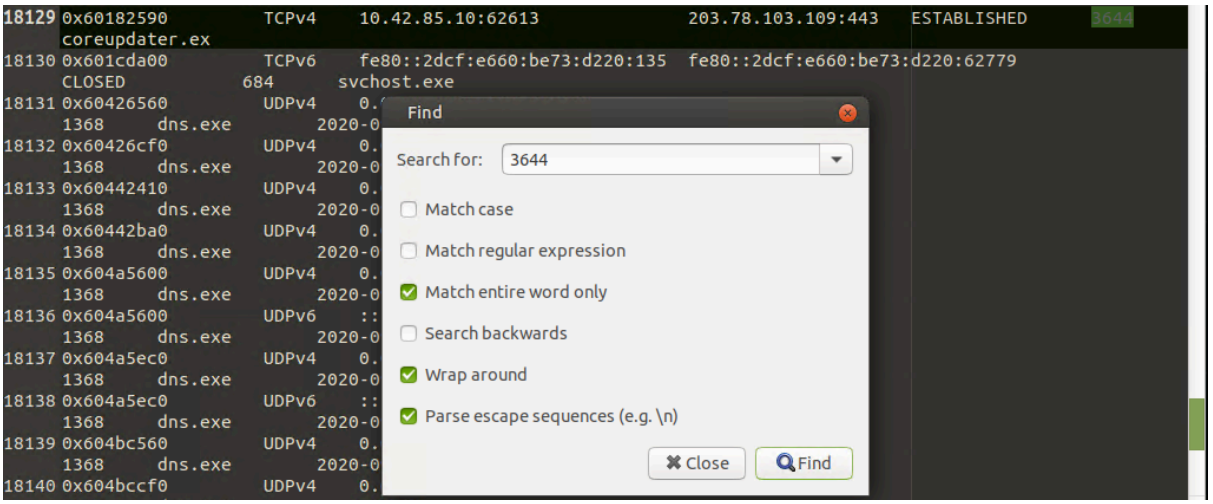


Figure 8

6c. What IP Address is the malware calling to?

Answer: 10.42.85.10 through port 62613 (Figures 7, 8)

6d. Where is this malware on disk?

Answer: C:\Windows\System32\coreupdater.exe (Figure 9)

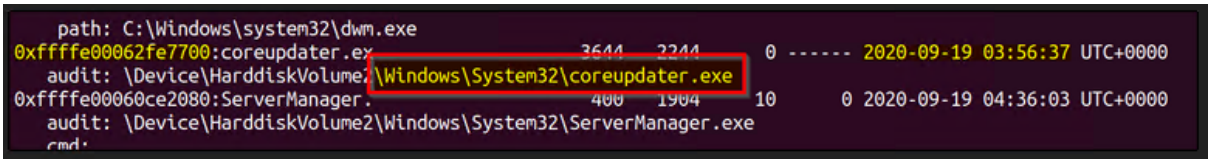


Figure 9

6e. When did it first appear?

Answer: Sat, Sept 19, 2020 at 2:39:26 GMT (Figure 10)

```
HTTP/1.0 200 OK
Server: SimpleHTTP/0.6 Python/2.7.18
Date: Sat, 19 Sep 2020 02:39:26 GMT
Content-type: text/html; charset=UTF-8
Content-Length: 228
```

Figure 10

6f. Did someone move it?

Answer: We can see that it was moved the admin downloads into the Windows\System32 directory. (Figures 11, 12, 13, 14)

2020-09-19 03:24:12		coreupdater.exe	.exe	87137	FileCreate	1	84880
2020-09-19 03:24:12		coreupdater.exe	.exe	87137	FileCreate|Close	1	84880
2020-09-19 03:24:12		coreupdater.exe	.exe	87137	FileDelete|Close	1	84880
2020-09-19 03:24:12		coreupdater.exe.2424urv.partial	.partial	87137	FileCreate	2	84880
2020-09-19 03:24:12		coreupdater.exe.2424urv.partial	.partial	87137	FileCreate|Close	2	84880
2020-09-19 03:24:12		coreupdater.exe.2424urv.partial	.partial	87137	DataTruncation	2	84880
2020-09-19 03:24:12		coreupdater.exe.2424urv.partial	.partial	87137	DataTruncation|Close	2	84880
2020-09-19 03:24:12		coreupdater.exe.2424urv.partial	.partial	87137	DataExtend	2	84880
2020-09-19 03:24:12		coreupdater.exe.2424urv.partial	.partial	87137	DataOverwrite|DataExtend	2	84880
2020-09-19 03:24:12		coreupdater.exe.2424urv.partial	.partial	87137	DataOverwrite|DataExtend|Basic…	2	84880
2020-09-19 03:24:12		coreupdater.exe.2424urv.partial	.partial	87137	DataOverwrite|DataExtend|Basic…	2	84880
2020-09-19 03:24:12		coreupdater[1].exe	.exe	76711	FileDelete|Close	12	87050
2020-09-19 03:24:12		coreupdater.exe.2424urv.partial	.partial	87137	RenameOldName	2	84880
2020-09-19 03:24:12		coreupdater.exe	.exe	87137	RenameNewName	2	84880
2020-09-19 03:24:12		coreupdater.exe	.exe	87137	RenameNewName|Close	2	84880
2020-09-19 03:24:50		coreupdater.exe	.exe	87137	RenameOldName	2	84880

Figure 11

Line	Tag	Update Timestamp	Parent Path	Name	Extension	Entry Number	Update Reasons	Sequence Number
16019		2020-09-17 16:46:26		Downloads		84880	ObjectIdChange|Close	1
16018		2020-09-17 16:46:26		Downloads		84880	ObjectIdChange	1
15873		2020-09-17 16:46:25		Downloads		84880	BasicInfoChange|Close	1
15872		2020-09-17 16:46:25		Downloads		84880	BasicInfoChange	1
14883		2020-09-17 16:46:16		Downloads		84880	BasicInfoChange|Close	1
14882		2020-09-17 16:46:16		Downloads		84880	BasicInfoChange	1
14881		2020-09-17 16:46:16		Downloads		84880	BasicInfoChange|Close	1
14880		2020-09-17 16:46:16		Downloads		84880	BasicInfoChange	1
14182		2020-09-17 16:46:15		Downloads		84880	SecurityChange|BasicInfoChange…	1
14181		2020-09-17 16:46:15		Downloads		84880	SecurityChange|BasicInfoChange	1
14180		2020-09-17 16:46:15		Downloads		84880	SecurityChange	1
14179		2020-09-17 16:46:15		Downloads		84880	FileCreate|Close	1
14178		2020-09-17 16:46:15		Downloads		84880	FileCreate	1

Figure 12

2020-09-19 03:40:42		coreupdater.exe	.exe	26213	RenameNewName	4	3254
2020-09-19 03:40:42		coreupdater.exe	.exe	26213	RenameNewName|Close	4	3254
2020-09-19 03:40:42		coreupdater.exe	.exe	26213	SecurityChange	4	3254
2020-09-19 03:40:42		coreupdater.exe	.exe	26213	SecurityChange|Clo…	4	3254
2020-09-19 03:40:49		coreupdater.exe	.exe	26213	StreamChange	4	3254
2020-09-19 03:40:49		coreupdater.exe	.exe	26213	StreamChange|Close	4	3254

Figure 13

Drag a column header here to group by that column

Enter text to search... Find

Line	Tag	Update Timestamp	Parent Path	Name	Extension	Entry Number	Update Reasons	Sequence N
35946		2020-09-19 03:40:42		System32		3254	ObjectIdChange	

Figure 14

6g. What were the capabilities of this malware?

Answer: This malware is capable of defence evasion, discovery of victim environment, command and control protocols, anti-static analysis, and micro-data manipulation (Figure 15).

Figure 15

6h. Is this malware easily obtained?

Answer: Yes, it is available through metasploit, shelma, and rozena. This can be seen on the VirusTotal page when viewing the coreupdater.exe hash.

6i. Was this malware installed with persistence on any machine?

Answer: The malware created a service to run on startup on both the DC (Figure 16) and Desktop (Figure 17) as well as a registry key on both systems.

CITADEL-DC01.C137.local	2020-09-19 04:39:59	7045		Name: AccessData Driver	StartType: demand start
CITADEL-DC01.C137.local	2020-09-19 03:56:55	7045		Name: pmhrio	StartType: demand start
CITADEL-DC01.C137.local	2020-09-19 03:44:29	7045		Name: mszhao	StartType: demand start
CITADEL-DC01.C137.local	2020-09-19 03:27:49	7045		Name: coreupdater	StartType: auto start
CITADEL-DC01.C137.local	2020-09-19 03:25:44	7045		Name: outmgo	StartType: demand start

Figure 16 - DC

DESKTOP-SDN1RPT.C137.local	2020-09-19 05:10:38	7045		Name: AccessData Driver	StartType: demand start
DESKTOP-SDN1RPT.C137.local	2020-09-19 05:08:59	7045		Name: WPD File System driver	StartType: demand start
DESKTOP-SDN1RPT.C137.local	2020-09-19 03:43:14	7045		Name: nehgye	StartType: demand start
DESKTOP-SDN1RPT.C137.local	2020-09-19 03:42:42	7045		Name: coreupdater	StartType: auto start
DESKTOP-SDN1RPT	2020-09-18 05:54:01	7045		Name: VMware Snapshot Provider	StartType: demand start

Figure 17 - Desktop

6i.1. When?

Answer: The installation of the service, “coreupdater”, first occurred on the DC at 2:27:49(Figure 16) and at 2:42:42 on DESKTOP-SDN1RPT. (Figure 17)

6i.2. Where?

Answer: Inside System32 and on the Desktop (Figures 18, 19, 20, 21)

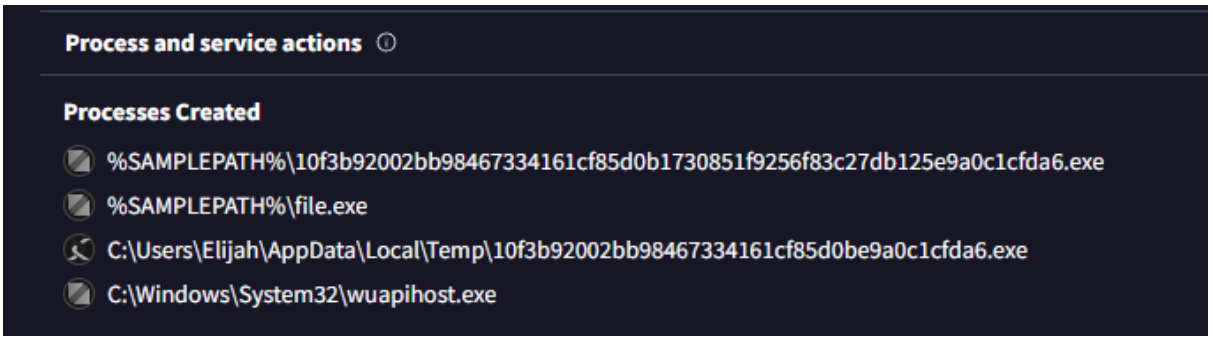


Figure 18

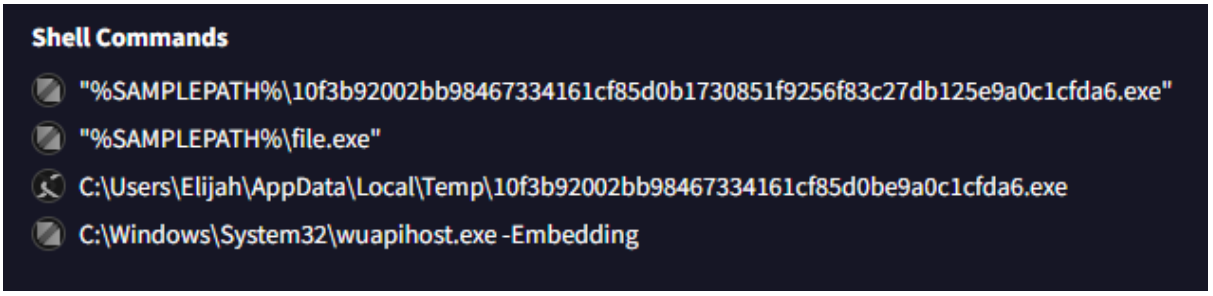


Figure 19

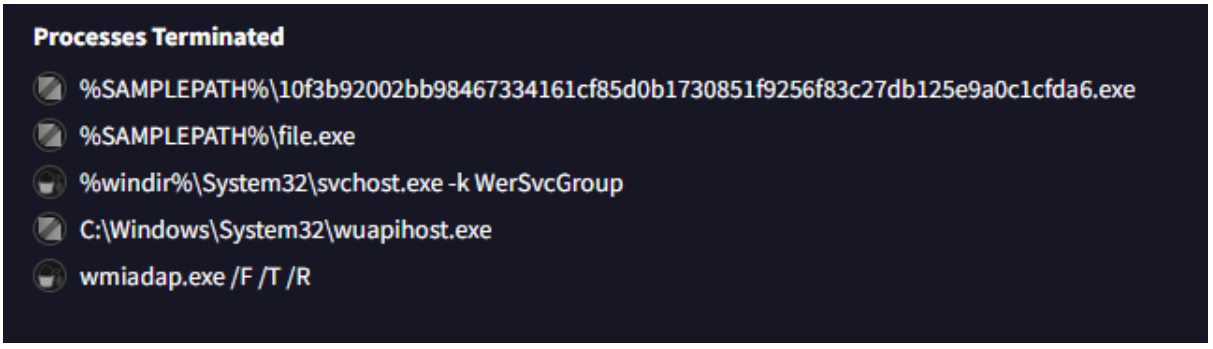


Figure 20

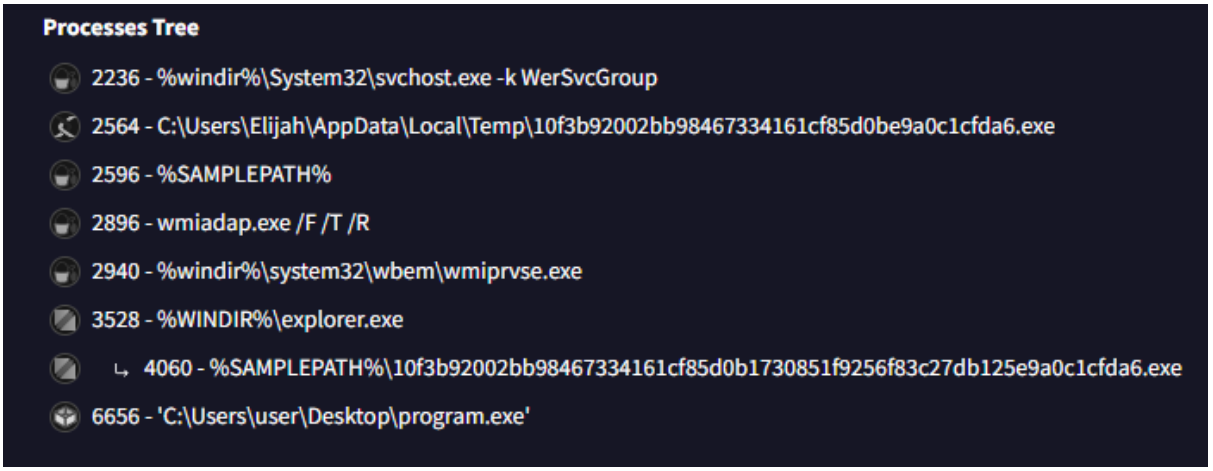


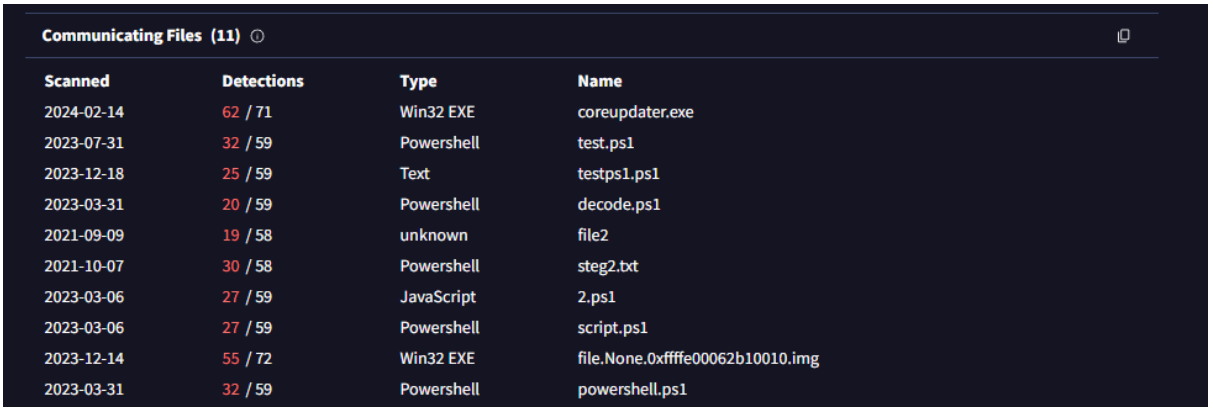
Figure 21

7. What malicious IP Addresses were involved? (Dan and Heather)

Answer: Yes

7a.Were any IP Addresses from known adversary infrastructure?

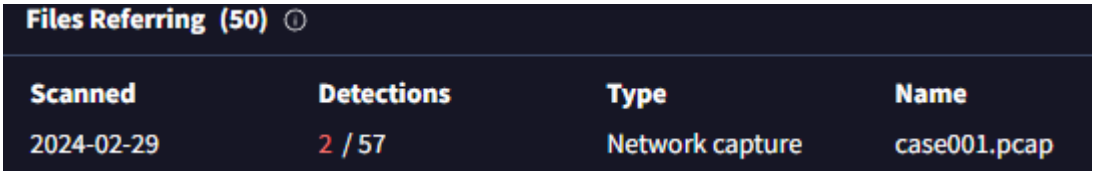
Answer: Yes. 203.78.103.109 has been compromised with suspicious communications files (Figure 22). These files have been flagged by multiple threat detection companies. 194.61.254.102 has been known to have been a hostile IP. The IP has been associated with RDP Brute Force attacks as noted by VirusTotal (Figures 23, 24).



Communicating Files (11)

Scanned	Detections	Type	Name
2024-02-14	62 / 71	Win32 EXE	coreupdater.exe
2023-07-31	32 / 59	Powershell	test.ps1
2023-12-18	25 / 59	Text	testps1.ps1
2023-03-31	20 / 59	Powershell	decode.ps1
2021-09-09	19 / 58	unknown	file2
2021-10-07	30 / 58	Powershell	steg2.txt
2023-03-06	27 / 59	JavaScript	2.ps1
2023-03-06	27 / 59	Powershell	script.ps1
2023-12-14	55 / 72	Win32 EXE	file.None.0xffffe00062b10010.img
2023-03-31	32 / 59	Powershell	powershell.ps1

Figure 22



Files Referring (50)

Scanned	Detections	Type	Name
2024-02-29	2 / 57	Network capture	case001.pcap

Figure 23

Figure 24

7b. Are these pieces of adversary infrastructure involved in other attacks around the time of the attack?

Answer: Yes, as we can see from the following screenshot the hash value has been flagged as compromised by 62/71 vendors on AlienVault. The coreupdater.exe has been recognized by several anti-malware detection companies in multiple attacks. AlienVault is still receiving updates, even as recently as 2 days ago, regarding this hash (Figure 25).

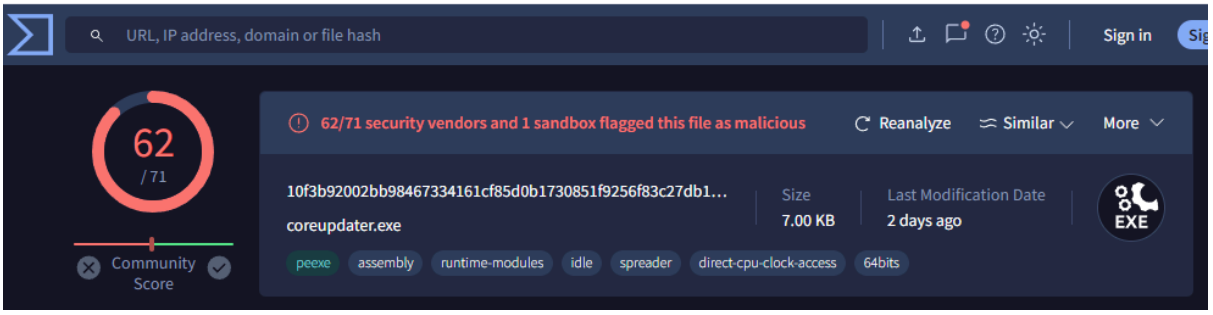


Figure 25

8. Did the attacker access any other systems? (Dan and Heather)

Answer: Yes, other systems were accessed.

8a. How?

Answer: As we can see from the following screenshot and mentioned before, the coreupdate.exe has the ability to write itself to other portions of the system (Figure 26). The attack was able to gain access to DESKTOP-SDN1RPT.C137.local via RDP from the DC using the admin account. The pcap has revealed an RDP connection after initial access (Figure 27). This connection between malicious IP and the victim address is integral for finding the answer to what has happened.

Figure 26

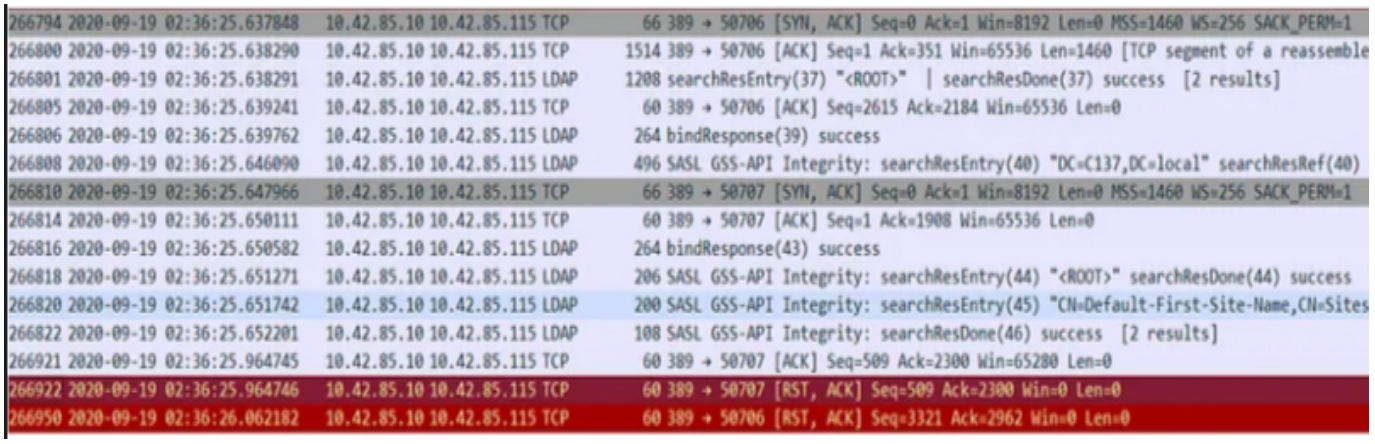


Figure 27

8b. When?

Answer: The attacker was able to gain remote access through the RDP protocol using an admin account (Figure 28) on the 19th at 2:36 (Figures 28, 29). This allowed the attacker access into the system to then start performing reconnaissance. The coreupdater.exe has a timestamp noting September 19, 2020 at 3:56:37 UTC+0000 (Figure 29). This backs up the theory of the coreupdater.exe performing actions on our system. We know access to the HKLM\SOFTWARE\ hives started as early as 2:43 (Figure 30). We can then begin to explore what information is accessed, when, and what was done with it.

Figure 28

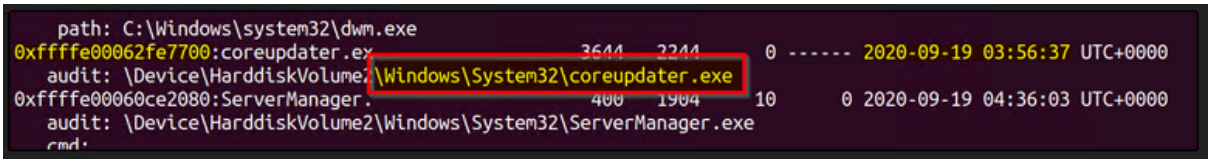


Figure 29

	A	B	C	D	E	F	
1	Time	Entry Location	Entry	Enable	Category	Profile	Description
872	10/23/1937 2:43 AM	HKLM\SOFTWARE\Microsoft\Windows\Curr	coreupc	enabled	Logon	System-wide	Windows PowerShell

Figure 30

8c. Did the attacker steal or access any data?

Answer: Yes

8c.1. When?

Answer: By going through the Hive files, again, we can get insight to where the attacker looked into the system.

- We can check for recently accessed files with MRU, which arranges the most recently used files at the top of the list.
- We can see that the admin accessed the “Secret” folder in the “FileShare” directory.
- Within the Desktop portion of the search we also notice there is a new zip called “loot” as well as the previously seen “Secret” zip files in the FileShare directory (Figures 31, 32).

Parent Path	File Name	Extension	Created0x10	Last Modified0x10
recent	lnk		=	=
.\Users\Administrator\AppData\Roaming\Microsoft\Windows\Recent	PortalGunPlans.lnk	.lnk	2020-09-18 22:34:02	2020-09-19 03:32:0
.\Users\Administrator\AppData\Roaming\Microsoft\Windows\Recent	NoJerry.lnk	.lnk	2020-09-18 22:29:54	2020-09-19 03:31:5
.\Users\Administrator\AppData\Roaming\Microsoft\Windows\Recent	Secret.lnk	.lnk	2020-09-18 22:29:54	2020-09-19 03:35:0
.\Users\Administrator\AppData\Roaming\Microsoft\Windows\Recent	Szechuan Sauce.lnk	.lnk	2020-09-18 22:35:59	2020-09-19 03:32:2
.\Users\Administrator\AppData\Roaming\Microsoft\Windows\Recent	SECRET_beth.lnk	.lnk	2020-09-18 22:39:22	2020-09-19 03:32:1
.\Users\Administrator\AppData\Roaming\Microsoft\Windows\Recent	Beth_Secret.lnk	.lnk	2020-09-19 03:35:07	2020-09-19 03:35:0

Figure 31

Parent Path	File Name	Extension	Created0x10	Last Modified0x10
.\Users\Administrator\AppData\Roaming\Microsoft\Windows\Re…	.lnk		-	-
.\Users\Administrator\AppData\Roaming\Microsoft\Windows\Recent	My Social Security Number.lnk	.lnk	2020-09-19 03:45:34	2020-09-19 03:45:3
.\Users\Administrator\AppData\Roaming\Microsoft\Windows\Recent	Plans.lnk	.lnk	2020-09-19 03:45:39	2020-09-19 03:45:3
.\Users\Administrator\AppData\Roaming\Microsoft\Windows\Recent	Portal_gun.lnk	.lnk	2020-09-19 03:45:54	2020-09-19 03:45:5
.\Users\Administrator\AppData\Roaming\Microsoft\Windows\Recent	Documents.lnk	.lnk	2020-09-19 03:45:34	2020-09-19 03:45:5
.\Users\Administrator\AppData\Roaming\Microsoft\Windows\Recent	loot.lnk	.lnk	2020-09-19 03:46:18	2020-09-19 03:46:1
.\Users\Administrator\AppData\Roaming\Microsoft\Windows\Recent	Thoughts.lnk	.lnk	2020-09-19 03:47:39	2020-09-19 03:47:3
.\Users\Administrator\AppData\Roaming\Microsoft\Windows\Recent	Desktop.lnk	.lnk	2020-09-19 03:47:39	2020-09-19 03:47:3

Figure 32

Zipped files are also important to note. This is because it makes the extraction of information easier and faster for attackers.

Looking more into these files we can confirm that they were created by the recently accessed, compromised admin account. This is a step to finding out that something was actually stolen (Figures 33, 34).

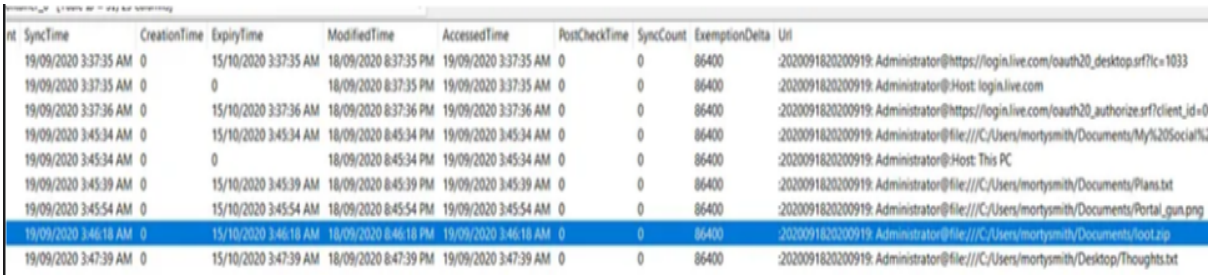
Name	Extension	Entry Number	Seq…	Paren…	…	Parent…	Upd…	Update Timestamp	Update Reasons
	zip	-	-	-		-	-		
Secret.zip	.zip	87102	2	86963	7		903…	2020-09-19 03:34:18	FileDelete|Close
Secret.zip	.zip	87102	2	86963	7		902…	2020-09-19 03:32:39	SecurityChange|RenameNewName
Secret.zip	.zip	87102	2	86963	7		902…	2020-09-19 03:32:39	SecurityChange|RenameNewName
Secret.zip	.zip	87101	2	86963	7		902…	2020-09-19 03:32:39	RenameOldName
Secret.zip	.zip	87101	2	86963	7		902…	2020-09-19 03:32:39	FileCreate|Close
Secret.zip	.zip	87101	2	86963	7		902…	2020-09-19 03:32:39	FileCreate

Figure 33

Name	Extension	Entry Number	Sequenc…	Parent E…	Pare…	Pa…	Update Seq…	Update Timestamp	Update Reasons
	.zip	-	-	-	-		-	-	
loot.zip	.zip	87470	2	88824	2		26375072	2020-09-19 03:47:09	FileDelete|Close
loot.zip	.zip	87470	2	88824	2		26372080	2020-09-19 03:46:18	ObjectIdChange|Close
loot.zip	.zip	87470	2	88824	2		26372000	2020-09-19 03:46:18	ObjectIdChange
loot.zip	.zip	87470	2	88824	2		26371920	2020-09-19 03:46:18	RenameNewName|Close
loot.zip	.zip	87470	2	88824	2		26371840	2020-09-19 03:46:18	RenameNewName

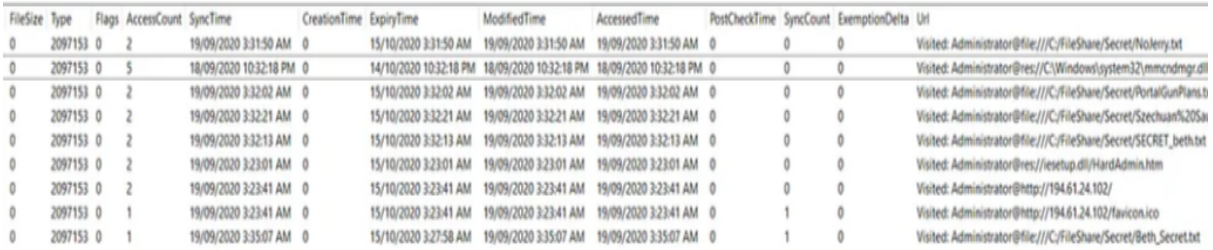
Figure 34

We can then trace these files to find out when the attacker actually got the files out of the system. This is the point of the final file movement before extraction (Figures 35, 36).



nt	SyncTime	CreationTime	ExpiryTime	ModifiedTime	AccessedTime	PostCheckTime	SyncCount	ExemptionDelta	Url
	19/09/2020 3:37:35 AM	0	15/10/2020 3:37:35 AM	18/09/2020 8:37:35 PM	19/09/2020 3:37:35 AM	0	0	86400	:2020091820200919: Administrator@https://login.live.com/oauth20_desktop.srf?lc=1033
	19/09/2020 3:37:35 AM	0	0	18/09/2020 8:37:35 PM	19/09/2020 3:37:35 AM	0	0	86400	:2020091820200919: Administrator@:Host: login.live.com
	19/09/2020 3:37:36 AM	0	15/10/2020 3:37:36 AM	18/09/2020 8:37:36 PM	19/09/2020 3:37:36 AM	0	0	86400	:2020091820200919: Administrator@https://login.live.com/oauth20_authorize.srf?client_id=0
	19/09/2020 3:45:34 AM	0	15/10/2020 3:45:34 AM	18/09/2020 8:45:34 PM	19/09/2020 3:45:34 AM	0	0	86400	:2020091820200919: Administrator@file:///C:/Users/mortysmith/Documents/My%20Social%2
	19/09/2020 3:45:34 AM	0	0	18/09/2020 8:45:34 PM	19/09/2020 3:45:34 AM	0	0	86400	:2020091820200919: Administrator@:Host: This PC
	19/09/2020 3:45:39 AM	0	15/10/2020 3:45:39 AM	18/09/2020 8:45:39 PM	19/09/2020 3:45:39 AM	0	0	86400	:2020091820200919: Administrator@file:///C:/Users/mortysmith/Documents/Plans.txt
	19/09/2020 3:45:54 AM	0	15/10/2020 3:45:54 AM	18/09/2020 8:45:54 PM	19/09/2020 3:45:54 AM	0	0	86400	:2020091820200919: Administrator@file:///C:/Users/mortysmith/Documents/Portal_gun.png
	19/09/2020 3:46:18 AM	0	15/10/2020 3:46:18 AM	18/09/2020 8:46:18 PM	19/09/2020 3:46:18 AM	0	0	86400	:2020091820200919: Administrator@file:///C:/Users/mortysmith/Documents/loot.zip
	19/09/2020 3:47:39 AM	0	15/10/2020 3:47:39 AM	18/09/2020 8:47:39 PM	19/09/2020 3:47:39 AM	0	0	86400	:2020091820200919: Administrator@file:///C:/Users/mortysmith/Desktop/Thoughts.txt

Figure 35



FileSize	Type	Flags	AccessCount	SyncTime	CreationTime	ExpiryTime	ModifiedTime	AccessedTime	PostCheckTime	SyncCount	ExemptionDelta	Url
0	2097153	0	2	19/09/2020 3:31:50 AM	0	15/10/2020 3:31:50 AM	19/09/2020 3:31:50 AM	19/09/2020 3:31:50 AM	0	0	0	Visited: Administrator@file:///C:/FileShare/Secret/Nolerry.txt
0	2097153	0	5	18/09/2020 10:32:18 PM	0	14/10/2020 10:32:18 PM	18/09/2020 10:32:18 PM	18/09/2020 10:32:18 PM	0	0	0	Visited: Administrator@res://C:\Windows\system32\mmcndmgr.dll
0	2097153	0	2	19/09/2020 3:32:02 AM	0	15/10/2020 3:32:02 AM	19/09/2020 3:32:02 AM	19/09/2020 3:32:02 AM	0	0	0	Visited: Administrator@file:///C:/FileShare/Secret/PortalGunPlans.t
0	2097153	0	2	19/09/2020 3:32:21 AM	0	15/10/2020 3:32:21 AM	19/09/2020 3:32:21 AM	19/09/2020 3:32:21 AM	0	0	0	Visited: Administrator@file:///C:/FileShare/Secret/Szechuan%20Sa
0	2097153	0	2	19/09/2020 3:32:13 AM	0	15/10/2020 3:32:13 AM	19/09/2020 3:32:13 AM	19/09/2020 3:32:13 AM	0	0	0	Visited: Administrator@file:///C:/FileShare/Secret/SECRET_beth.txt
0	2097153	0	2	19/09/2020 3:23:01 AM	0	15/10/2020 3:23:01 AM	19/09/2020 3:23:01 AM	19/09/2020 3:23:01 AM	0	0	0	Visited: Administrator@res://iesetup.dll/HardAdmin.htm
0	2097153	0	2	19/09/2020 3:23:41 AM	0	15/10/2020 3:23:41 AM	19/09/2020 3:23:41 AM	19/09/2020 3:23:41 AM	0	0	0	Visited: Administrator@http://194.61.24.102/
0	2097153	0	1	19/09/2020 3:23:41 AM	0	15/10/2020 3:23:41 AM	19/09/2020 3:23:41 AM	19/09/2020 3:23:41 AM	0	1	0	Visited: Administrator@http://194.61.24.102/favicon.ico
0	2097153	0	1	19/09/2020 3:35:07 AM	0	15/10/2020 3:27:58 AM	19/09/2020 3:35:07 AM	19/09/2020 3:35:07 AM	0	1	0	Visited: Administrator@file:///C:/FileShare/Secret/Beth_Secret.txt

Figure 36

9. What was the network layout of the victim network? (Dan and Heather)

Answer: Microsoft Windows 8 - Win8SPOx64, Win81U1x64
Windows Server - Win2012R2x64 (Figure 37)

```
user@user-pc:~/Desktop/Case001$ volatility -f citadeldc01.mem imageinfo
Volatility Foundation Volatility Framework 2.6.1
INFO    : volatility.debug    : Determining profile based on KDBG search...
          Suggested Profile(s) : Win8SP0x64, Win81U1x64, Win2012R2x64_18340, Win2012R2x64, Win2012x64, Win8SP1x6
4_18340, Win8SP1x64
                     AS Layer1 : SkipDuplicatesAMD64PagedMemory (Kernel AS)
                     AS Layer2 : FileAddressSpace (/home/user/Desktop/Case001/citadeldc01.mem)
                      PAE type : No PAE
                           DTB : 0x1a7000L
                          KDBG : 0xf800cba9ba20L
          Number of Processors : 2
     Image Type (Service Pack) : 0
                KPCR for CPU 0 : 0xfffff800cbaea000L
                KPCR for CPU 1 : 0xffffd0019fd55000L
             KUSER_SHARED_DATA : 0xfffff78000000000L
           Image date and time : 2020-09-19 04:39:59 UTC+0000
     Image local date and time : 2020-09-18 21:39:59 -0700
user@user-pc:~/Desktop/Case001$
```

Figure 37

References

1. Volatility is an open-source memory forensics tool
   https://volatilityfoundation.org/
2. Wireshark is an open-source network scanning tool
   https://www.wireshark.org/
3. VirusTotal is an online services used to analyzes suspicious files and URLs to detect types of Malware or malicious software
   https://www.virustotal.com/gui/file/9af8a2d9ca5d904b9ca6696016b2a794ef7eb97693ccca22df2a367305d31b88
4. Metasploit is a Framework used to determine the source of malware.
   https://www.metasploit.com
5. AlienVault is an online free resource for identifying whether a hash, website, or file is safe to use or malware.
   https://www.alienvault.com