Scenario Overview

'Iaman Informant' was working as a manager of the technology development division at a famous international company OOO that developed state-of-the-art technologies and gadgets.

One day, at a place which 'Mr. Informant' visited on business, he received an offer from 'Spy Conspirator' to leak of sensitive information related to the newest technology. Actually, 'Mr. Conspirator' was an employee of a rival company, and 'Mr. Informant' decided to accept the offer for large amounts of money, and began establishing a detailed leakage plan.

'Mr. Informant' made a deliberate effort to hide the leakage plan. He discussed it with 'Mr. Conspirator' using an e-mail service like a business relationship. He also sent samples of confidential information though personal cloud storage.

After receiving the sample data, 'Mr. Conspirator' asked for the direct delivery of storage devices that stored the remaining (large amounts of) data. Eventually, 'Mr. Informant' tried to take his storage devices away, but he and his devices were detected at the security checkpoint of the company. And he was suspected of leaking the company data.

At the security checkpoint, although his devices (a USB memory stick and a CD) were briefly checked (protected with portable write blockers), there was no evidence of any leakage. And then, they were immediately transferred to the digital forensics laboratory for further analysis.

The information security policies in the company include the following:

1. Confidential electronic files should be stored and kept in the authorized external storage devices and the secured network drives.

2. Confidential paper documents and electronic files can be accessed only within the allowed time range from 10:00 AM to 16:00 PM with the appropriate permissions.

3. Non-authorized electronic devices such as laptops, portable storages, and smart devices cannot be carried onto the company.

4. All employees are required to pass through the ‘Security Checkpoint’ system.
5. All storage devices such as HDD, SSD, USB memory stick, and CD/DVD are forbidden under the ‘Security Checkpoint’ rules.

In addition, although the company managed separate internal and external networks and used DRM (Digital Rights Management) / DLP (Data Loss Prevention) solutions for their information security, ‘Mr. Informant’ had sufficient authority to bypass them. He was also very interested in IT (Information Technology), and had a slight knowledge of digital forensics.

In this scenario, find any evidence of the data leakage, and any data that might have been generated from the suspect’s electronic devices.

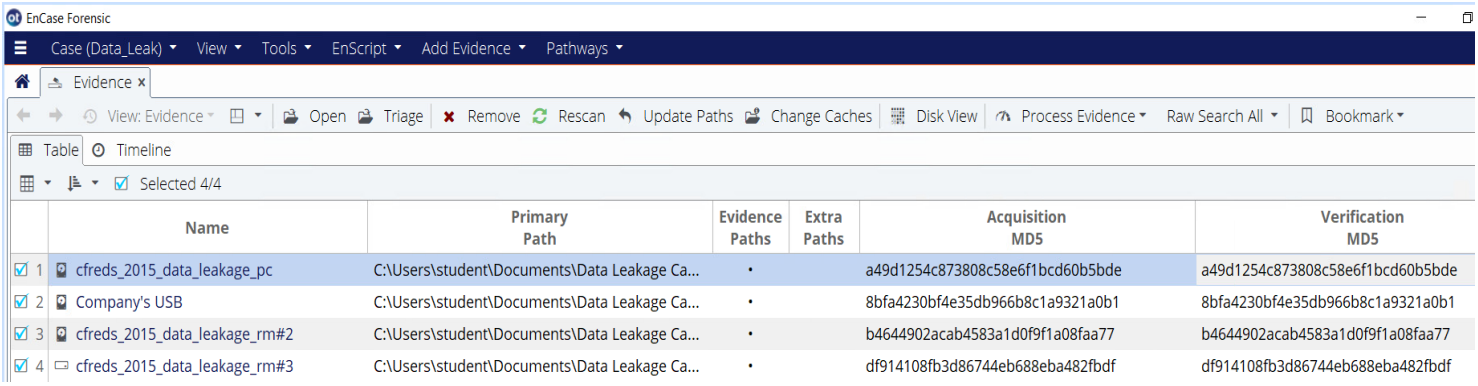
[**Please note:** If you have any issues clicking on the links to download the files, please "right click" and choose to "save as".]

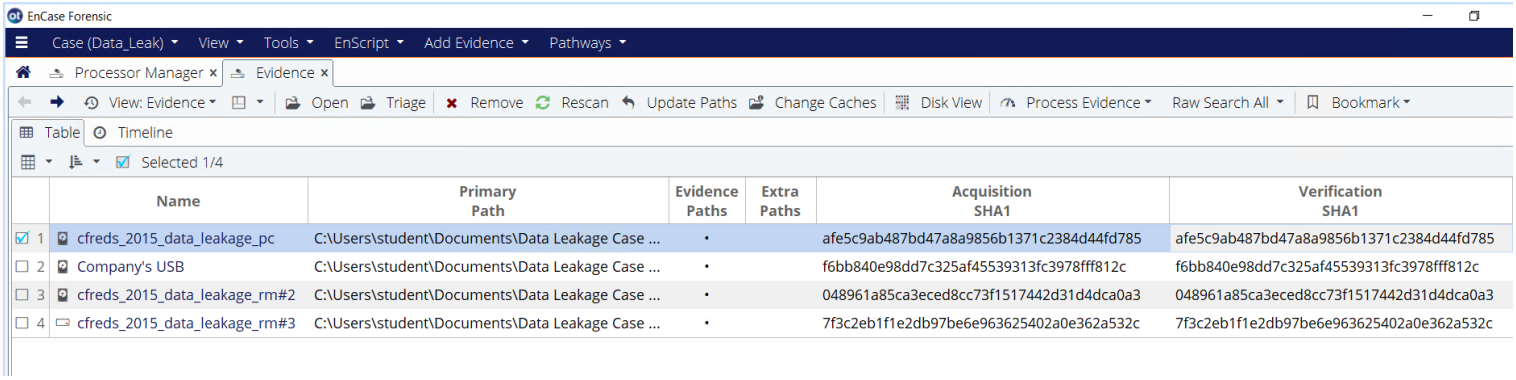
1. What are the hash values (MD5 & SHA-1) of all images? Does the acquisition and verification hash value match?

Answer:

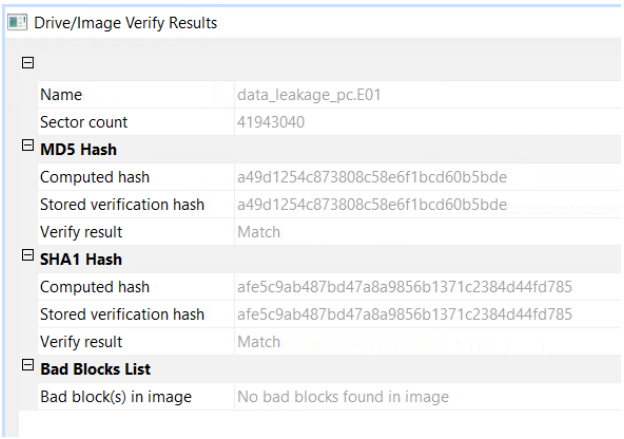
Evidence	Hash Algorithm	Hash value
PC	MD5	a49d1254c873808c58e6f1bcd60b5bde
	SHA-1	afe5c9ab487bd47a8a9856b1371c2384d44fd785
RM#1	MD5	8bfa4230bf4e35db966b8c1a9321a0b1
	SHA-1	f6bb840e98dd7c325af45539313fc3978fff812c
RM#2	MD5	b4644902acab4583a1d0f9f1a08faa77
	SHA-1	048961a85ca3eced8cc73f1517442d31d4dca0a3
RM#3 (Type3)	MD5	df914108fb3d86744eb688eba482fbdf
	SHA-1	7f3c2eb1f1e2db97be6e963625402a0e362a532c

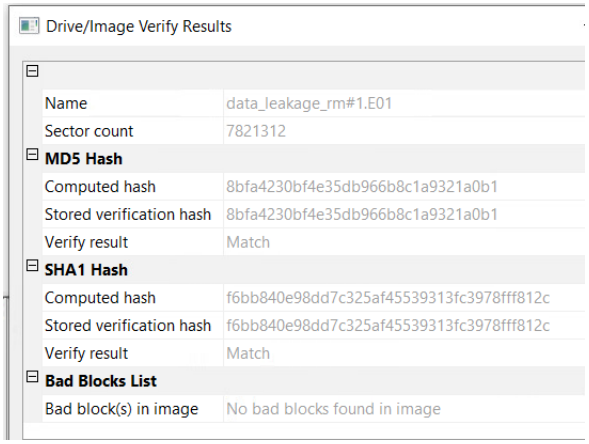
- **Evidence from EnCase:**

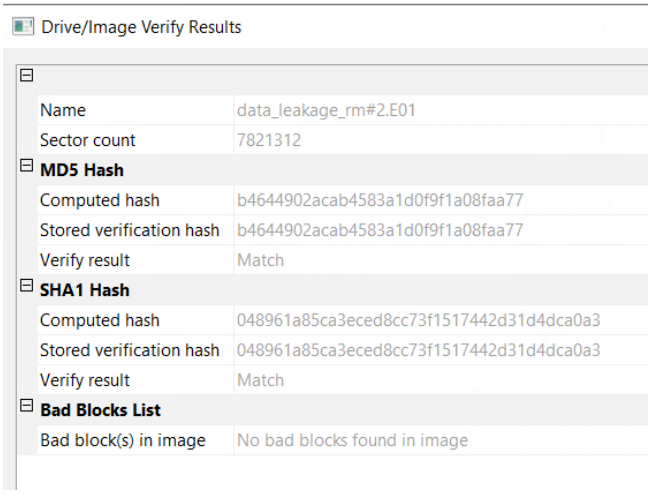


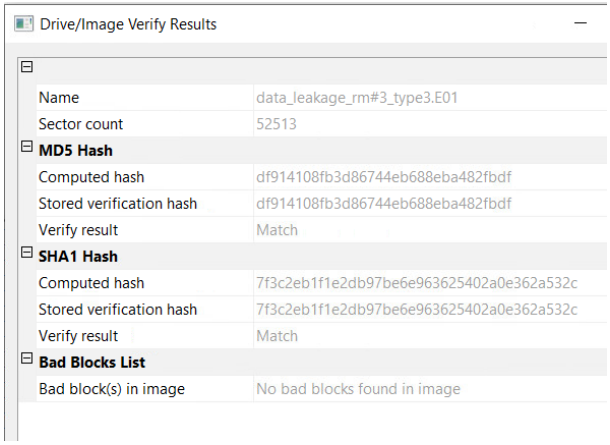


- **Evidence verified from FTK Imager**:





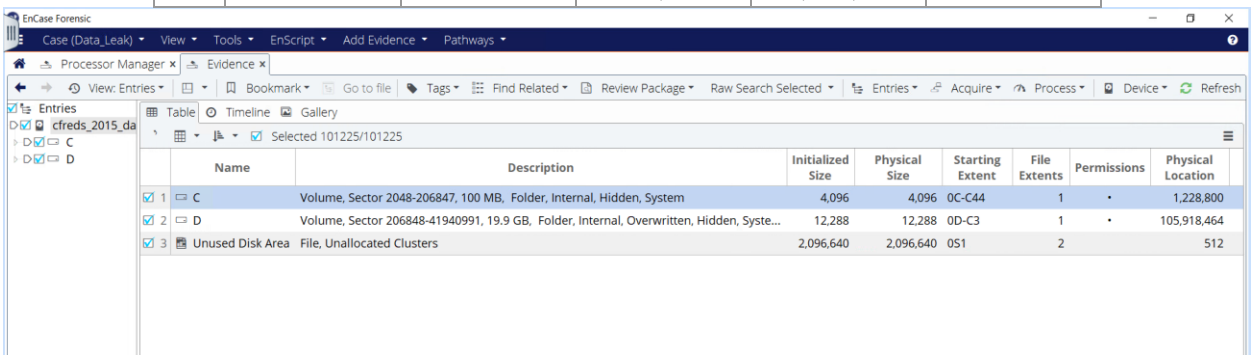




2. Identify the partition information of PC image.

Answer:

No.	Name	File system	Start Sector	Total Sectors	Size
1	C:	NTFS	2,048	204,800	100 MB
2	D:	NTFS	206,848	41,734,144	19.9 GB

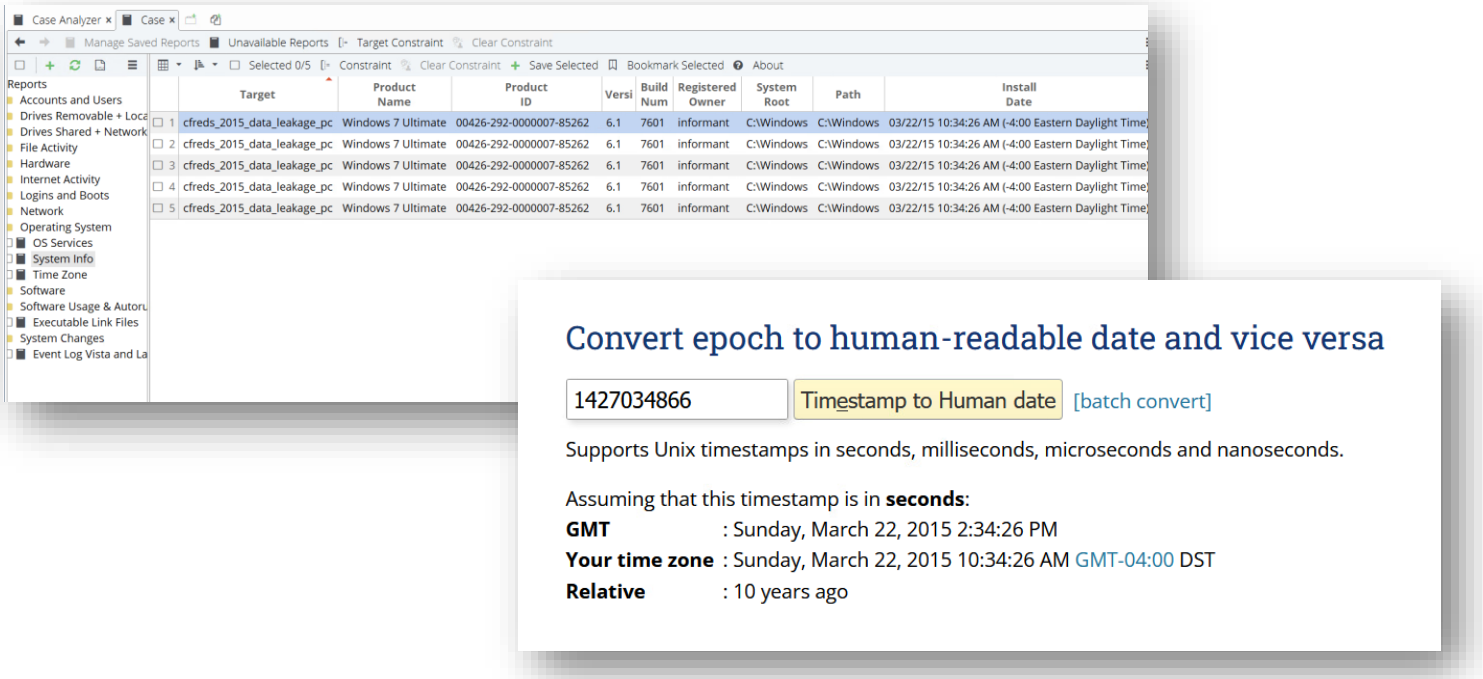


3. Explain installed OS information in detail. (OS name, install date, registered owner…)

Answer: This path points to a critical section within the SOFTWARE registry hive for user profile on a Windows system. The **CurrentVersion** key under **Microsoft\Windows NT** stores essential information about the current version of Windows and its components, including installed software, system settings, user preferences, and application data. Analyzing this key can reveal crucial details about the user's software environment, system configuration, and potentially any modifications or anomalies related to installed programs or system settings, which could be valuable in a digital forensics investigation. The information about the OS is mentioned below.

Path:
Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config\SOFTWARE\CMI-CreateHive{199DAFC2-6F16-4946-BF90-5A3FC3A60902}\Microsoft\Windows NT\CurrentVersion

Serial Number	OS Information	Answer
1	Current Version	6.1
2	Current Build	Client
3	Software Type	System
4	Current Type	Multiprocessor free
5	Install Date	22nd March 2015; Sunday; 14:34:26 GMT+0000 (TS=1427034866)
6	Registered Owner	Informant
7	System Root	C:\Windows
8	Installation Type	Client
9	Edition ID	Ultimate
10	Product Name	Windows 7 Ultimate
11	Product ID	00426-292-0000007-85262

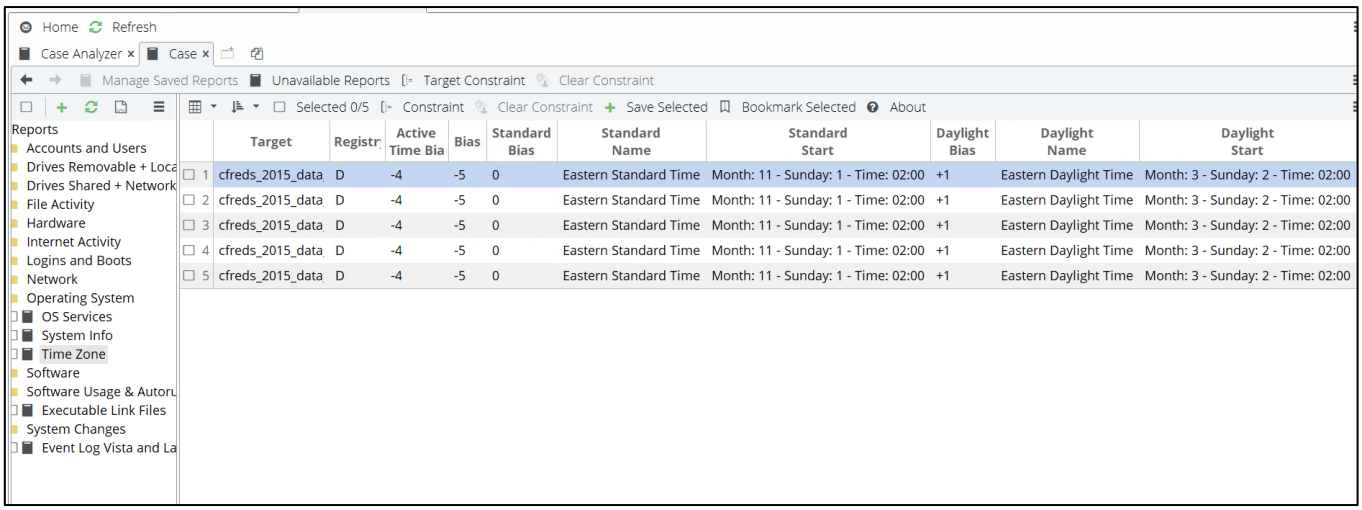


4. What is the timezone setting?

Answer: This path points to a registry key within the SYSTEM hive of a potentially compromised Windows system, specifically identifying the TimeZoneKeyName value for a particular user profile or control set. This value stores the name of the current time zone used by the system. In a forensic context, this information can be crucial for accurately interpreting timestamps, correlating events across different time zones, and understanding the system's geographical location or user's travel history. The time zone setting of the device is "**Eastern Standard Time"**

Path:
Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config\SYSTEM\CMI-CreateHive{2A7FB991-7BBE-4F9D-B91E-7CB51D4737F5}\ControlSet001\Control\TimeZoneInformation\TimeZoneKeyName

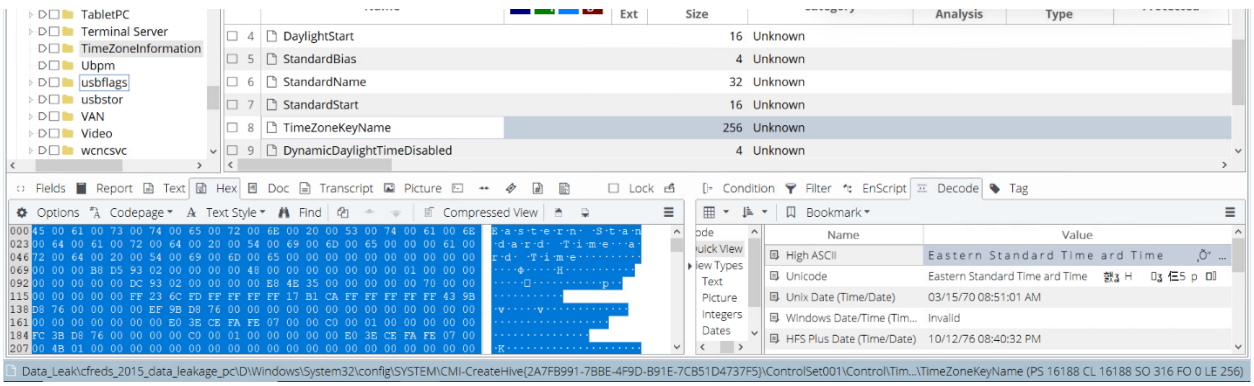
Evidence:



5. What is the computer name?

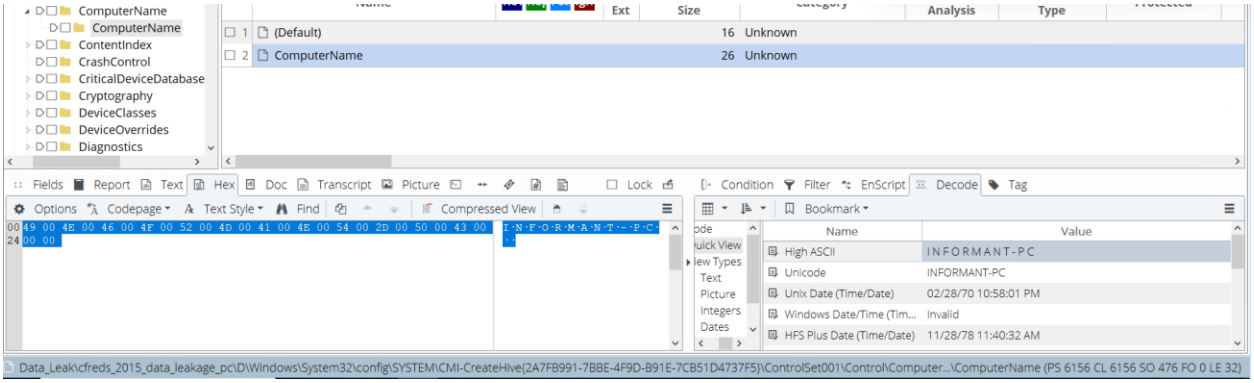
Answer: The name of computer is "**INFORMANT-PC**

Path:
Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config\SYSTEM\CMI-CreateHive{2A7FB991-7BBE-4F9D-B91E-



7CB51D4737F5}\ControlSet001\Control\ComputerName\ComputerName\ComputerNam
e

Evidence:



This file path points to a specific registry key within the SYSTEM hive of a Windows system revealing the **computer name**. The path also reveals that the data comes from the SYSTEM hive which contains the system-wide settings and ControlSet001 that usually have the active configuration. This helps understand the context of the computer name within the system's setup.

6. List all accounts in OS except the system accounts: *Administrator, Guest, systemprofile, LocalService, NetworkService*. (Account name, login count, last logon date...)

Answer: The users other than Administrator, Guest, systemprofile, LocalService are:

- informant
- admin11
- ITechTeam
- Temporary

Account	SID	Login Count	Account Created Time	Last Login Time	Login Failure Time
informant	1000	10	2015-03-22 09:33:54	2015-03-25 09:45:59	2015-03-25 09:45:43
admin11	1001	2	2015-03-22 10:51:54	2015-03-22 10:57:02	2015-03-22 10:53:02
ITechTeam	1002	0	2015-03-22 10:52:30	-	-
Temporary	1003	1	2015-03-22 10:53:01	2015-03-22 10:55:57	2015-03-22 10:56:37

	Target	User	Friendly Name	Last Logon	Security ID
36	cfreds_2015_data_leakage_pc	Administrator	Administrator	11/20/10 10:47:20 PM (-5:00 Eastern Standard Time)	S-1-5-21-2425377081-3129163575-2985601102-500
37	cfreds_2015_data_leakage_pc	temporary	temporary	03/22/15 11:55:57 AM (-4:00 Eastern Daylight Time)	S-1-5-21-2425377081-3129163575-2985601102-1003
38	cfreds_2015_data_leakage_pc	temporary	temporary	03/22/15 11:55:57 AM (-4:00 Eastern Daylight Time)	S-1-5-21-2425377081-3129163575-2985601102-1003
39	cfreds_2015_data_leakage_pc	temporary	temporary	03/22/15 11:55:57 AM (-4:00 Eastern Daylight Time)	S-1-5-21-2425377081-3129163575-2985601102-1003
40	cfreds_2015_data_leakage_pc	temporary	temporary	03/22/15 11:55:57 AM (-4:00 Eastern Daylight Time)	S-1-5-21-2425377081-3129163575-2985601102-1003
41	cfreds_2015_data_leakage_pc	temporary	temporary	03/22/15 11:55:57 AM (-4:00 Eastern Daylight Time)	S-1-5-21-2425377081-3129163575-2985601102-1003
42	cfreds_2015_data_leakage_pc	temporary	temporary	03/22/15 11:55:57 AM (-4:00 Eastern Daylight Time)	S-1-5-21-2425377081-3129163575-2985601102-1003
43	cfreds_2015_data_leakage_pc	admin11	admin11	03/22/15 11:57:02 AM (-4:00 Eastern Daylight Time)	S-1-5-21-2425377081-3129163575-2985601102-1001
44	cfreds_2015_data_leakage_pc	admin11	admin11	03/22/15 11:57:02 AM (-4:00 Eastern Daylight Time)	S-1-5-21-2425377081-3129163575-2985601102-1001
45	cfreds_2015_data_leakage_pc	admin11	admin11	03/22/15 11:57:02 AM (-4:00 Eastern Daylight Time)	S-1-5-21-2425377081-3129163575-2985601102-1001
46	cfreds_2015_data_leakage_pc	admin11	admin11	03/22/15 11:57:02 AM (-4:00 Eastern Daylight Time)	S-1-5-21-2425377081-3129163575-2985601102-1001
47	cfreds_2015_data_leakage_pc	admin11	admin11	03/22/15 11:57:02 AM (-4:00 Eastern Daylight Time)	S-1-5-21-2425377081-3129163575-2985601102-1001
48	cfreds_2015_data_leakage_pc	admin11	admin11	03/22/15 11:57:02 AM (-4:00 Eastern Daylight Time)	S-1-5-21-2425377081-3129163575-2985601102-1001
49	cfreds_2015_data_leakage_pc	informant	informant	03/25/15 10:45:59 AM (-4:00 Eastern Daylight Time)	S-1-5-21-2425377081-3129163575-2985601102-1000
50	cfreds_2015_data_leakage_pc	informant	informant	03/25/15 10:45:59 AM (-4:00 Eastern Daylight Time)	S-1-5-21-2425377081-3129163575-2985601102-1000
51	cfreds_2015_data_leakage_pc	informant	informant	03/25/15 10:45:59 AM (-4:00 Eastern Daylight Time)	S-1-5-21-2425377081-3129163575-2985601102-1000
52	cfreds_2015_data_leakage_pc	informant	informant	03/25/15 10:45:59 AM (-4:00 Eastern Daylight Time)	S-1-5-21-2425377081-3129163575-2985601102-1000
53	cfreds_2015_data_leakage_pc	informant	informant	03/25/15 10:45:59 AM (-4:00 Eastern Daylight Time)	S-1-5-21-2425377081-3129163575-2985601102-1000

7. Who was the last user to log on to a PC?

Answer: The Last user to logon into the PC was ”informant”. He logged into the system at “03/25/15 10:45:59 AM (-4:00 Eastern Daylight Time)”

Path: Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config\SAM\CMI-CreateHive{C4E7BA2B-68E8-499C-B1A1-371AC8D717C7}\SAM\Domains\Account\Users\

Evidence:

	Target	User	Friendly Name	Last Logon
51	cfreds_2015_data_leakage_pc	admin11	admin11	03/22/15 11:57:02 AM (-4:00 Eastern Daylight Time)
52	cfreds_2015_data_leakage_pc	admin11	admin11	03/22/15 11:57:02 AM (-4:00 Eastern Daylight Time)
53	cfreds_2015_data_leakage_pc	admin11	admin11	03/22/15 11:57:02 AM (-4:00 Eastern Daylight Time)
54	cfreds_2015_data_leakage_pc	admin11	admin11	03/22/15 11:57:02 AM (-4:00 Eastern Daylight Time)
55	cfreds_2015_data_leakage_pc	admin11	admin11	03/22/15 11:57:02 AM (-4:00 Eastern Daylight Time)
56	cfreds_2015_data_leakage_pc	admin11	admin11	03/22/15 11:57:02 AM (-4:00 Eastern Daylight Time)
57	cfreds_2015_data_leakage_pc	informant	informant	03/25/15 10:45:59 AM (-4:00 Eastern Daylight Time)
58	cfreds_2015_data_leakage_pc	informant	informant	03/25/15 10:45:59 AM (-4:00 Eastern Daylight Time)
59	cfreds_2015_data_leakage_pc	informant	informant	03/25/15 10:45:59 AM (-4:00 Eastern Daylight Time)
60	cfreds_2015_data_leakage_pc	informant	informant	03/25/15 10:45:59 AM (-4:00 Eastern Daylight Time)
61	cfreds_2015_data_leakage_pc	informant	informant	03/25/15 10:45:59 AM (-4:00 Eastern Daylight Time)
62	cfreds_2015_data_leakage_pc	informant	informant	03/25/15 10:45:59 AM (-4:00 Eastern Daylight Time)
63	cfreds_2015_data_leakage_pc	informant	informant	03/25/15 10:45:59 AM (-4:00 Eastern Daylight Time)

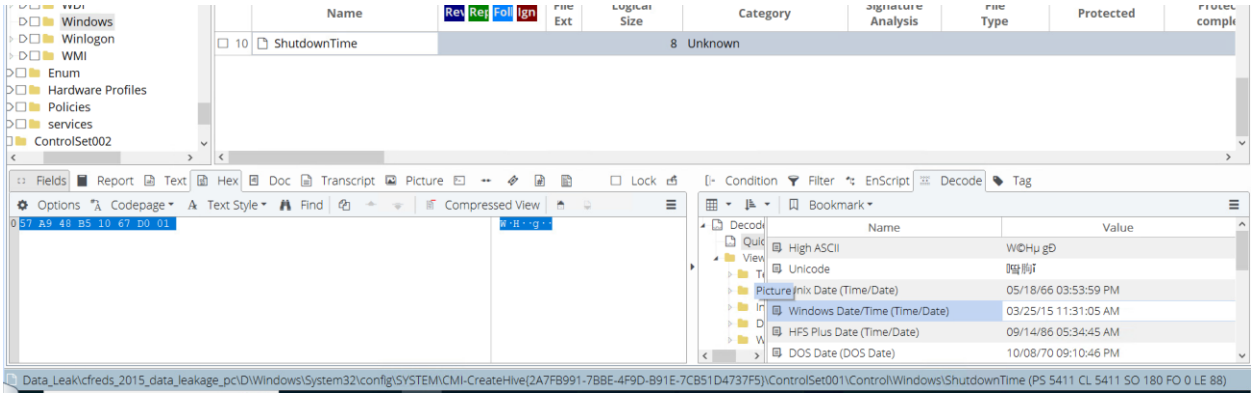
8. When was the last recorded shutdown date/time?

Answer: the last recorded shutdown date and time was **March 25, 2015, at 3:31:05 PM GMT**.

This was derived by converting the given time of 11:31:05 AM EST on March 25, 2015, to GMT, taking into account that Daylight Saving Time (DST) was in effect.

Path:
Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config\SYSTEM\CMI-CreateHive{2A7FB991-7BBE-4F9D-B91E-7CB51D4737F5}\ControlSet001\Control\Windows\ShutdownTime

Evidence:

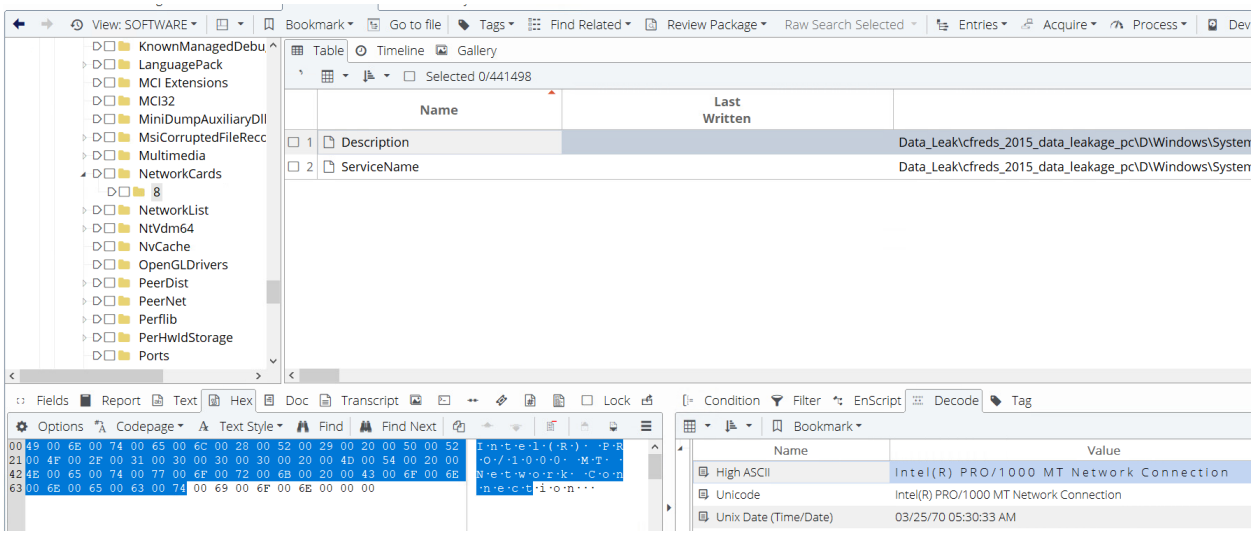


9. Explain the information of network interface(s) with an IP address assigned by DHCP.

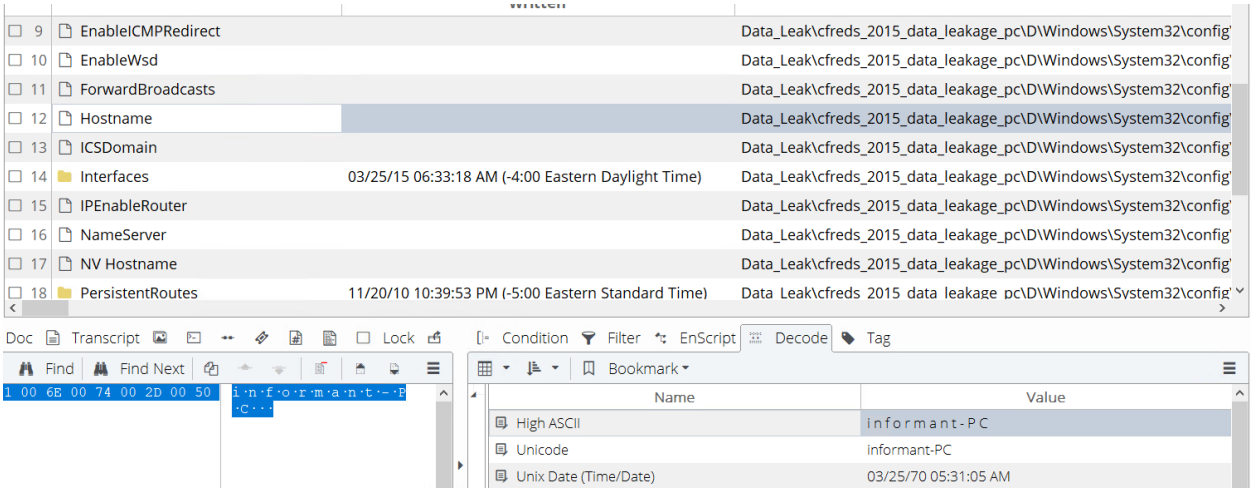
Answer:

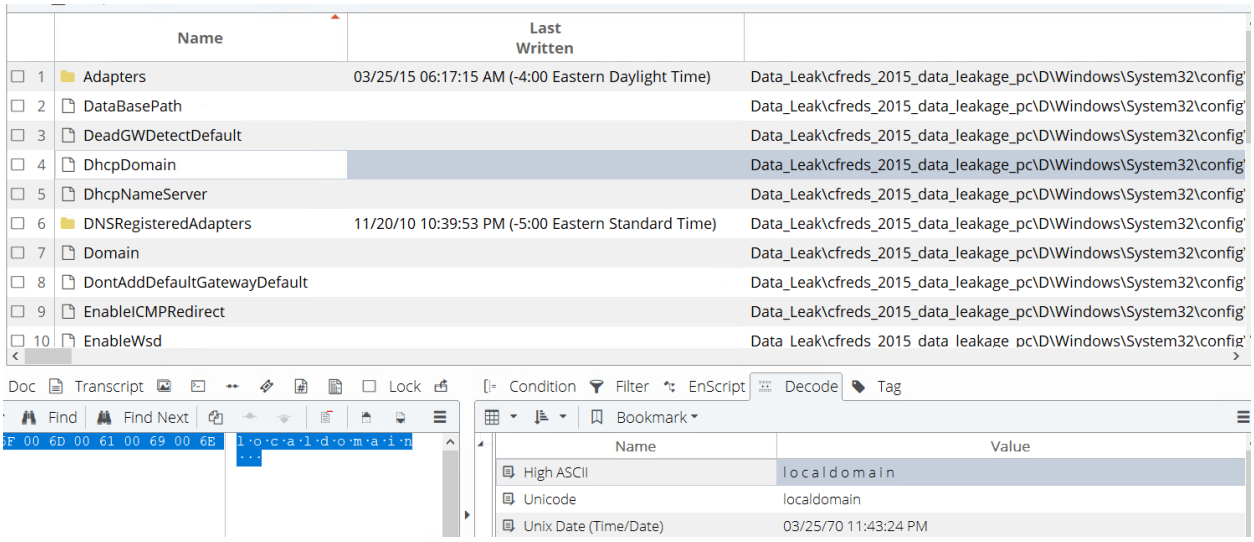
Serial Number	Network Interface Information	Answer
1	DHCP Enabled	Yes
2	DHCP Server	10.11.11.254
3	IP Address	10.11.11.129
4	Subnet Mask	10.11.11.254
5	Server Name	10.11.11.2
6	Domain Name	localdomain
7	Default Gateway	255.255.255.0
8	Network Card	Intel(R) PRO/1000 MT Network Connection

Path:
Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config\SOFTWARE\CMI-CreateHive{199DAFC2-6F16-4946-BF90-5A3FC3A60902}\Microsoft\Windows NT\CurrentVersion\NetworkCards\8\Description



Path:
Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config\SYSTEM\CMI-CreateHive{2A7FB991-7BBE-4F9D-B91E-7CB51D4737F5}\ControlSet001\services\Tcpip\





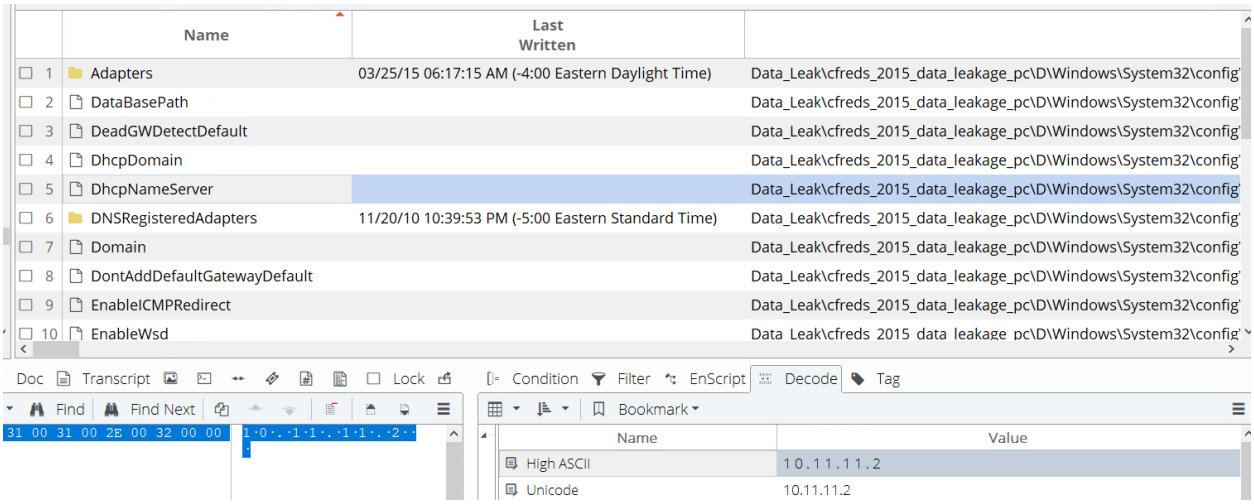
	Name	Last Written	
1	Adapters	03/25/15 06:17:15 AM (-4:00 Eastern Daylight Time)	Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
2	DataBasePath		Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
3	DeadGWDetectDefault		Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
4	DhcpDomain		Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
5	DhcpNameServer		Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
6	DNSRegisteredAdapters	11/20/10 10:39:53 PM (-5:00 Eastern Standard Time)	Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
7	Domain		Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
8	DontAddDefaultGatewayDefault		Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
9	EnableICMPRedirect		Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
10	EnableWsd		Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config

Doc Transcript Lock Condition Filter EnScript Decode Tag

Find Find Next Bookmark

6F 00 6D 00 61 00 69 00 6E l·o·c·a·l·d·o·m·a·i·n

Name	Value
High ASCII	localdomain
Unicode	localdomain
Unix Date (Time/Date)	03/25/70 11:43:24 PM



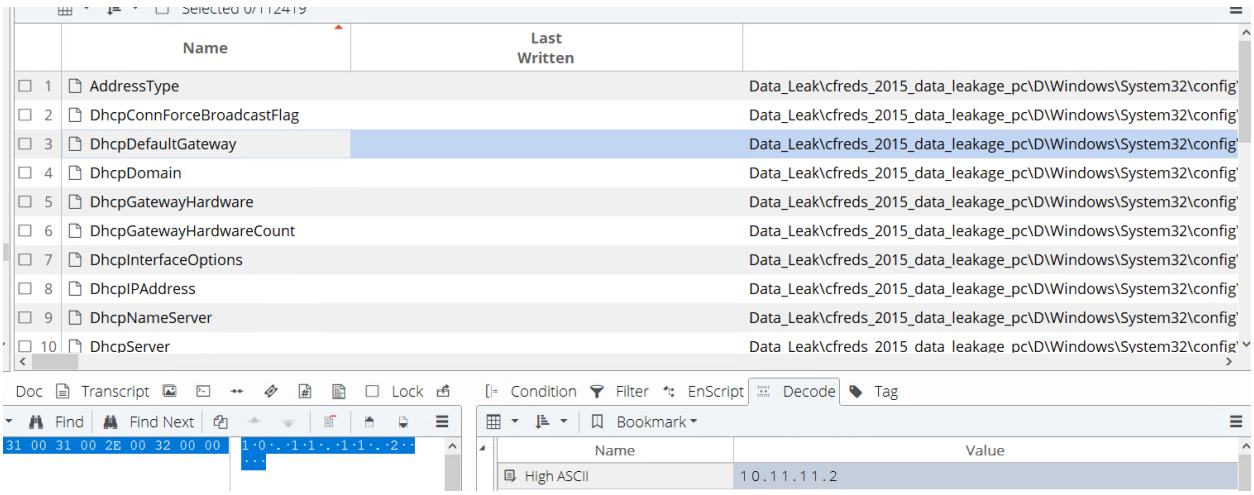
	Name	Last Written	
1	Adapters	03/25/15 06:17:15 AM (-4:00 Eastern Daylight Time)	Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
2	DataBasePath		Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
3	DeadGWDetectDefault		Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
4	DhcpDomain		Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
5	DhcpNameServer		Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
6	DNSRegisteredAdapters	11/20/10 10:39:53 PM (-5:00 Eastern Standard Time)	Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
7	Domain		Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
8	DontAddDefaultGatewayDefault		Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
9	EnableICMPRedirect		Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
10	EnableWsd		Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config

Doc Transcript Lock Condition Filter EnScript Decode Tag

Find Find Next Bookmark

31 00 31 00 2E 00 32 00 00 1·0·.·1·1·.·1·1·.·2·· .

Name	Value
High ASCII	10.11.11.2
Unicode	10.11.11.2



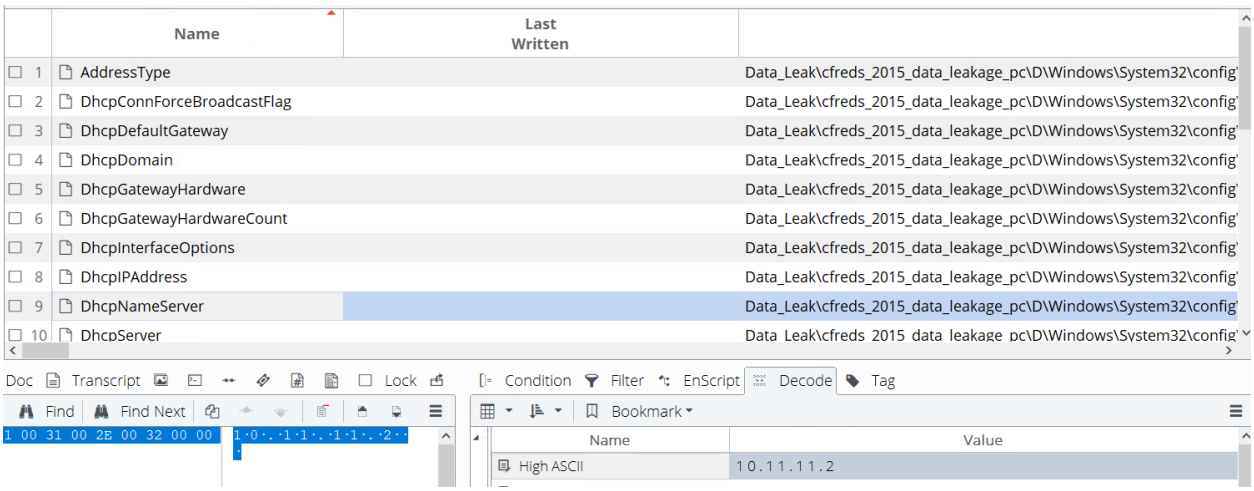
	Name	Last Written	
1	AddressType		Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
2	DhcpConnForceBroadcastFlag		Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
3	DhcpDefaultGateway		Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
4	DhcpDomain		Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
5	DhcpGatewayHardware		Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
6	DhcpGatewayHardwareCount		Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
7	DhcpInterfaceOptions		Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
8	DhcpIPAddress		Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
9	DhcpNameServer		Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
10	DhcpServer		Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config

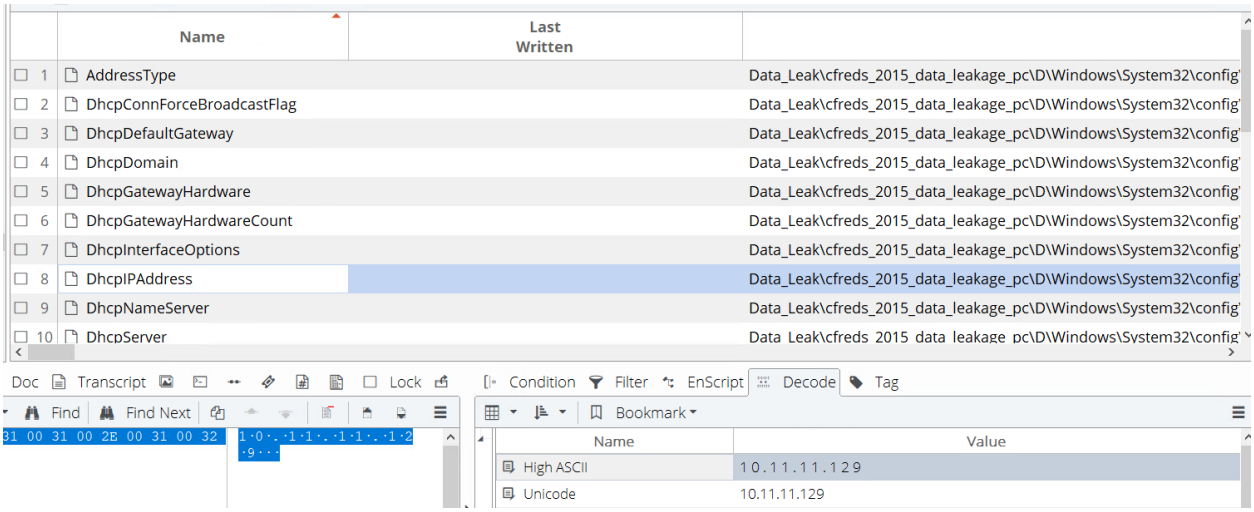
Doc Transcript Lock Condition Filter EnScript Decode Tag

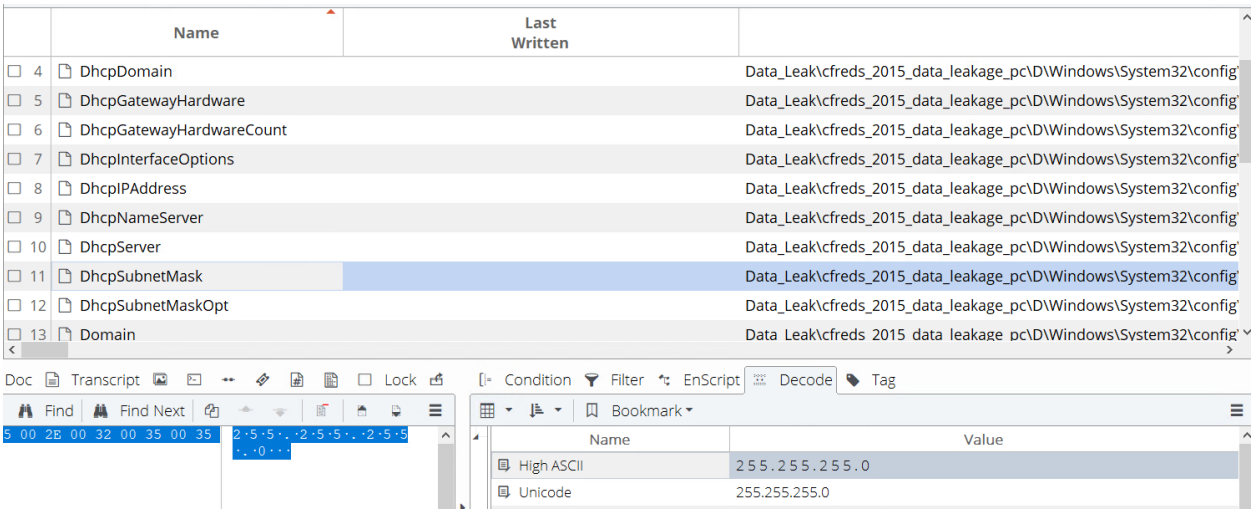
Find Find Next Bookmark

31 00 31 00 2E 00 32 00 00 1·0·.·1·1·.·1·1·.·2·· ...

Name	Value
High ASCII	10.11.11.2


Name
Last Written
1 AddressType
2 DhcpConnForceBroadcastFlag
3 DhcpDefaultGateway
4 DhcpDomain
5 DhcpGatewayHardware
6 DhcpGatewayHardwareCount
7 DhcpInterfaceOptions
8 DhcpIPAddress
9 DhcpNameServer
10 DhcpServer
Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
Doc Transcript Lock Condition Filter EnScript Decode Tag
Find Find Next Bookmark
Name Value
High ASCII 10.11.11.2


Name
Last Written
1 AddressType
2 DhcpConnForceBroadcastFlag
3 DhcpDefaultGateway
4 DhcpDomain
5 DhcpGatewayHardware
6 DhcpGatewayHardwareCount
7 DhcpInterfaceOptions
8 DhcpIPAddress
9 DhcpNameServer
10 DhcpServer
Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
Doc Transcript Lock Condition Filter EnScript Decode Tag
Find Find Next Bookmark
Name Value
High ASCII 10.11.11.129
Unicode 10.11.11.129


Name
Last Written
4 DhcpDomain
5 DhcpGatewayHardware
6 DhcpGatewayHardwareCount
7 DhcpInterfaceOptions
8 DhcpIPAddress
9 DhcpNameServer
10 DhcpServer
11 DhcpSubnetMask
12 DhcpSubnetMaskOpt
13 Domain
Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config
Doc Transcript Lock Condition Filter EnScript Decode Tag
Find Find Next Bookmark
Name Value
High ASCII 255.255.255.0
Unicode 255.255.255.0

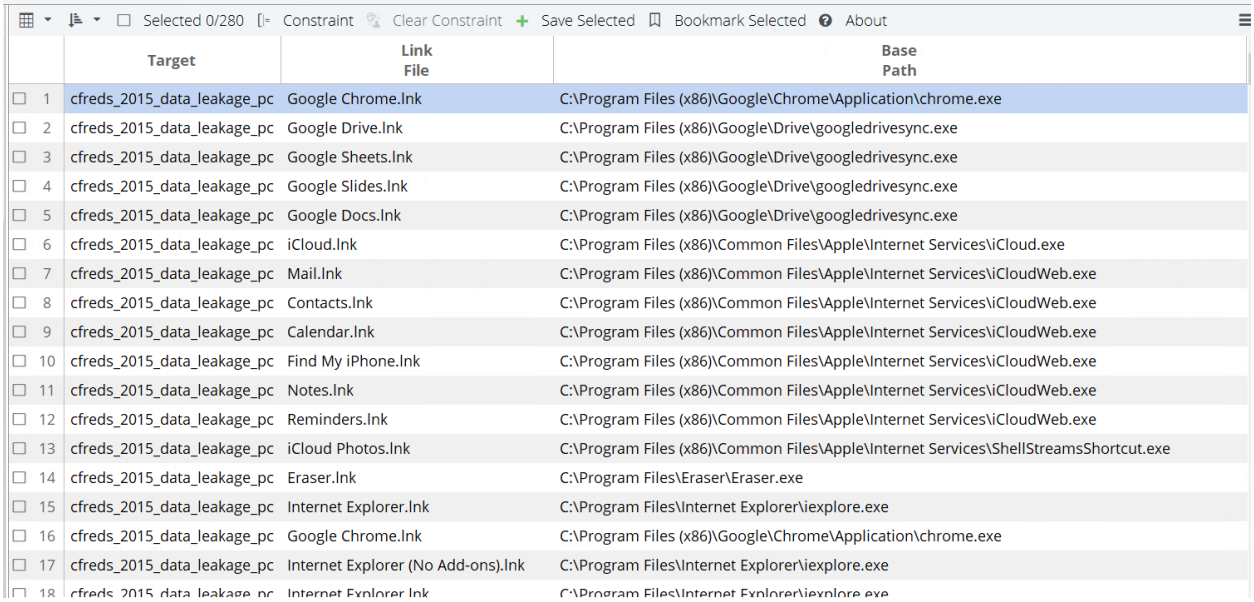
10. What applications were installed by the suspect after installing OS?

Answer:

11. List application execution logs.
    (Executable path, execution time, execution count…)

Answer: The execution logs can be found from many directories like: prefetch directory, UserAssist Key, Shimcache (AppCompatCache), Event Logs, Jump Lists, etc. This are the prime directories where this file execution logs are usually available.

Path: Data_Leak\cfreds_2015_data_leakage_pc\D\Program Files (x86)\Common Files\Apple\Internet Services\iCloudWeb.exe



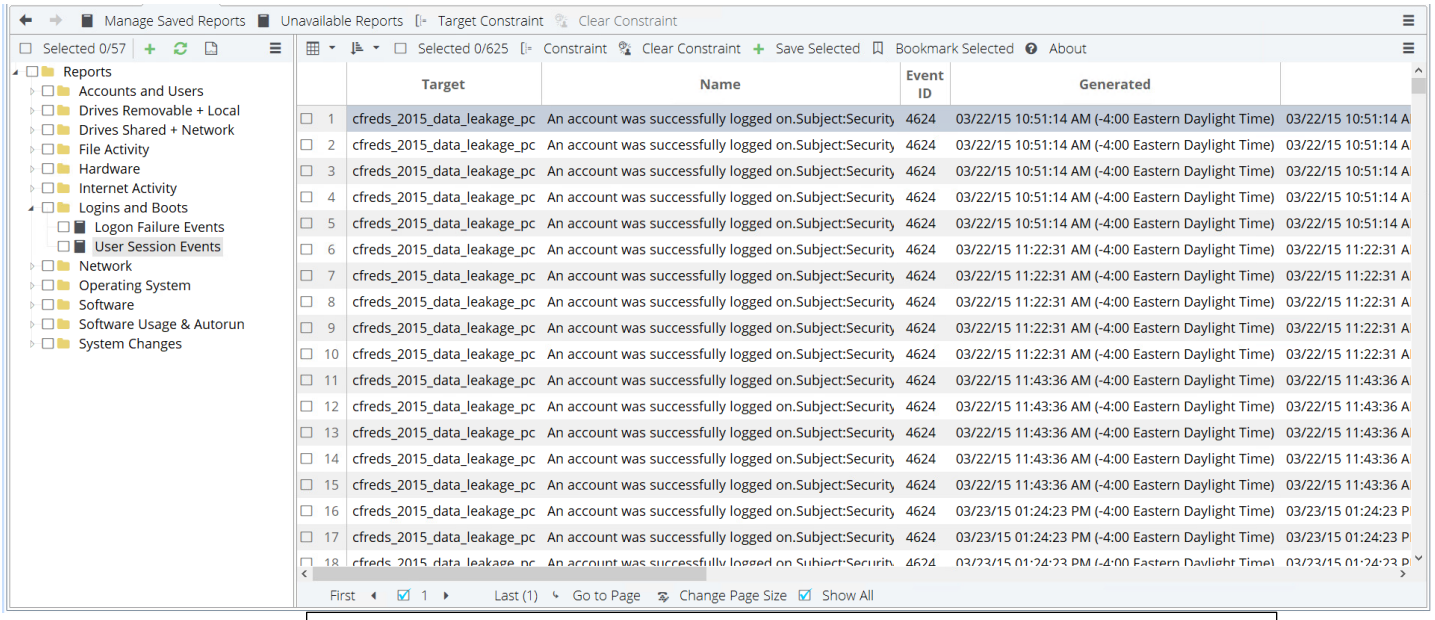
Selected 0/280 | Constraint | Clear Constraint | Save Selected | Bookmark Selected | About

	Target	Link File	Base Path
1	cfreds_2015_data_leakage_pc	Google Chrome.lnk	C:\Program Files (x86)\Google\Chrome\Application\chrome.exe
2	cfreds_2015_data_leakage_pc	Google Drive.lnk	C:\Program Files (x86)\Google\Drive\googledrivesync.exe
3	cfreds_2015_data_leakage_pc	Google Sheets.lnk	C:\Program Files (x86)\Google\Drive\googledrivesync.exe
4	cfreds_2015_data_leakage_pc	Google Slides.lnk	C:\Program Files (x86)\Google\Drive\googledrivesync.exe
5	cfreds_2015_data_leakage_pc	Google Docs.lnk	C:\Program Files (x86)\Google\Drive\googledrivesync.exe
6	cfreds_2015_data_leakage_pc	iCloud.lnk	C:\Program Files (x86)\Common Files\Apple\Internet Services\iCloud.exe
7	cfreds_2015_data_leakage_pc	Mail.lnk	C:\Program Files (x86)\Common Files\Apple\Internet Services\iCloudWeb.exe
8	cfreds_2015_data_leakage_pc	Contacts.lnk	C:\Program Files (x86)\Common Files\Apple\Internet Services\iCloudWeb.exe
9	cfreds_2015_data_leakage_pc	Calendar.lnk	C:\Program Files (x86)\Common Files\Apple\Internet Services\iCloudWeb.exe
10	cfreds_2015_data_leakage_pc	Find My iPhone.lnk	C:\Program Files (x86)\Common Files\Apple\Internet Services\iCloudWeb.exe
11	cfreds_2015_data_leakage_pc	Notes.lnk	C:\Program Files (x86)\Common Files\Apple\Internet Services\iCloudWeb.exe
12	cfreds_2015_data_leakage_pc	Reminders.lnk	C:\Program Files (x86)\Common Files\Apple\Internet Services\iCloudWeb.exe
13	cfreds_2015_data_leakage_pc	iCloud Photos.lnk	C:\Program Files (x86)\Common Files\Apple\Internet Services\ShellStreamsShortcut.exe
14	cfreds_2015_data_leakage_pc	Eraser.lnk	C:\Program Files\Eraser\Eraser.exe
15	cfreds_2015_data_leakage_pc	Internet Explorer.lnk	C:\Program Files\Internet Explorer\iexplore.exe
16	cfreds_2015_data_leakage_pc	Google Chrome.lnk	C:\Program Files (x86)\Google\Chrome\Application\chrome.exe
17	cfreds_2015_data_leakage_pc	Internet Explorer (No Add-ons).lnk	C:\Program Files\Internet Explorer\iexplore.exe
18	cfreds_2015_data_leakage_pc	Internet Explorer.lnk	C:\Program Files\Internet Explorer\iexplore.exe

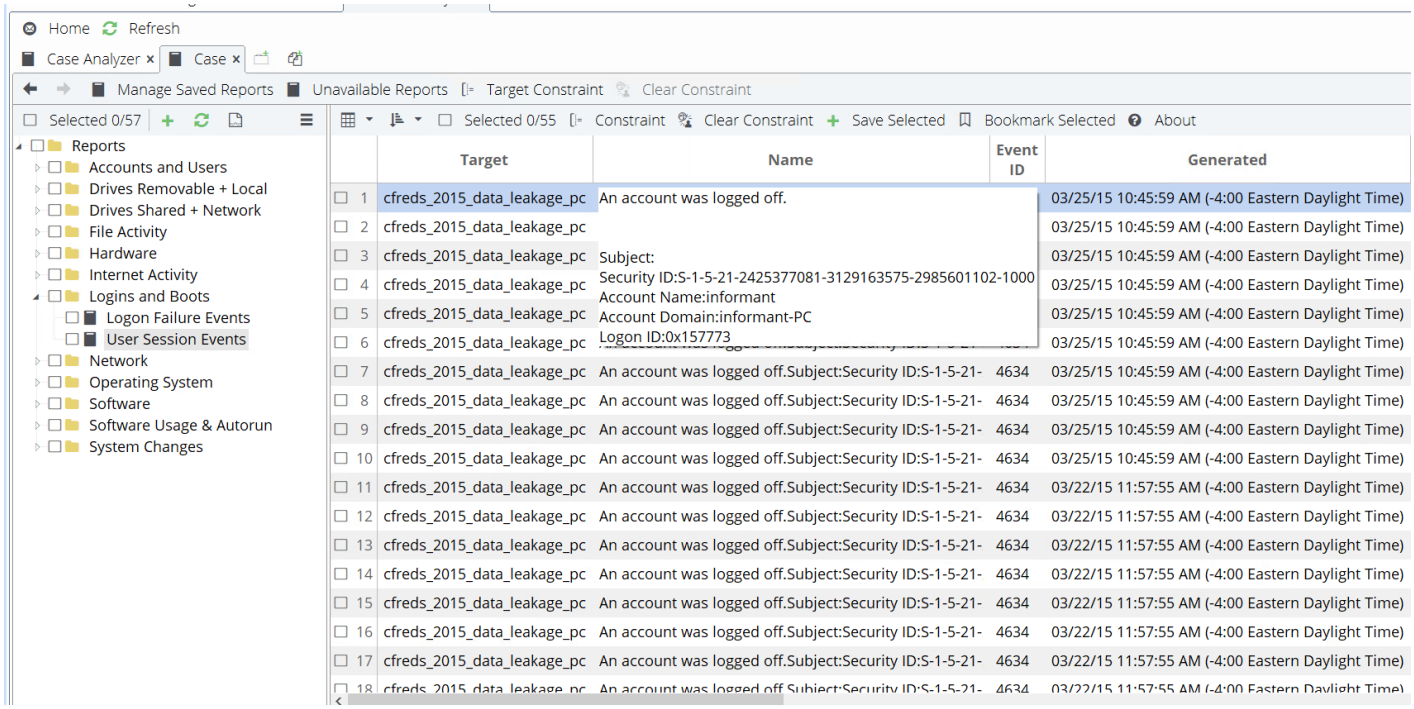
There are multiple executable files executed, and all the files are in different directories.

12. List all traces about the system on/off and the user logon/logoff.
    (It should be considered only during a time range between 09:00 and 18:00 in the timezone from Question 4.)

Answer: This data is taken from the event log file named “security.evtx and system.evtx.” **These values** can be interpreted from the Event ID column of the activity log. Path for both successful logons and logoffs: **D:\Windows\System32\winevt\Logs\Security.evtx**

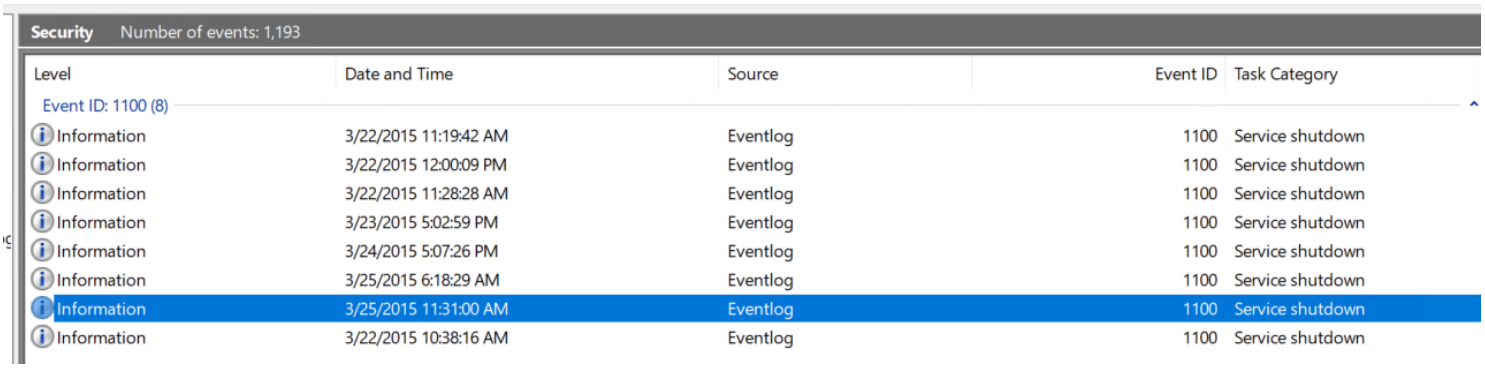


There are total of 625 successful logons made into the computer. This figure is not accurate as it contains many duplicated values as well



There are total of 55 successful logoffs made into the computer. This figure is not accurate as it contains many duplicated values as well

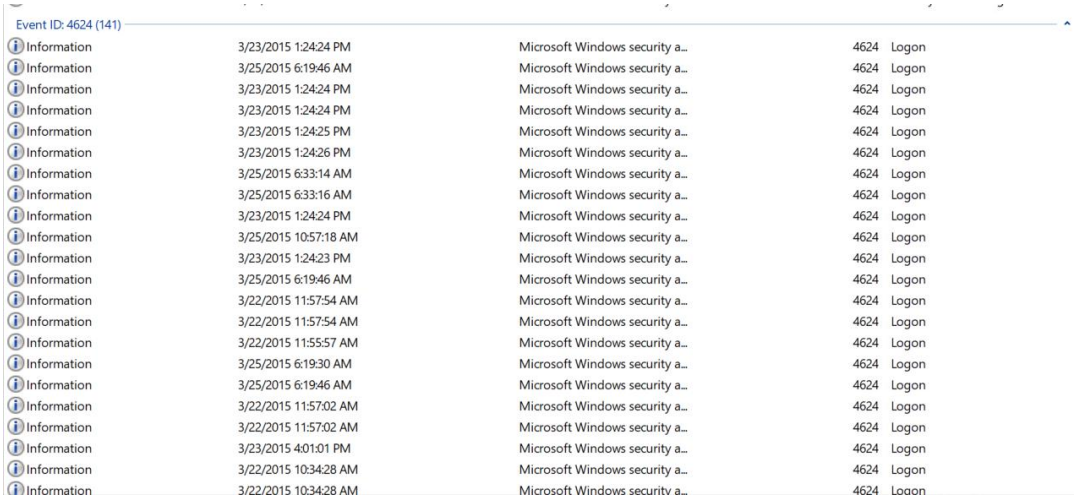
- Event ID 1100: Audit Log Cleared



Security Number of events: 1,193

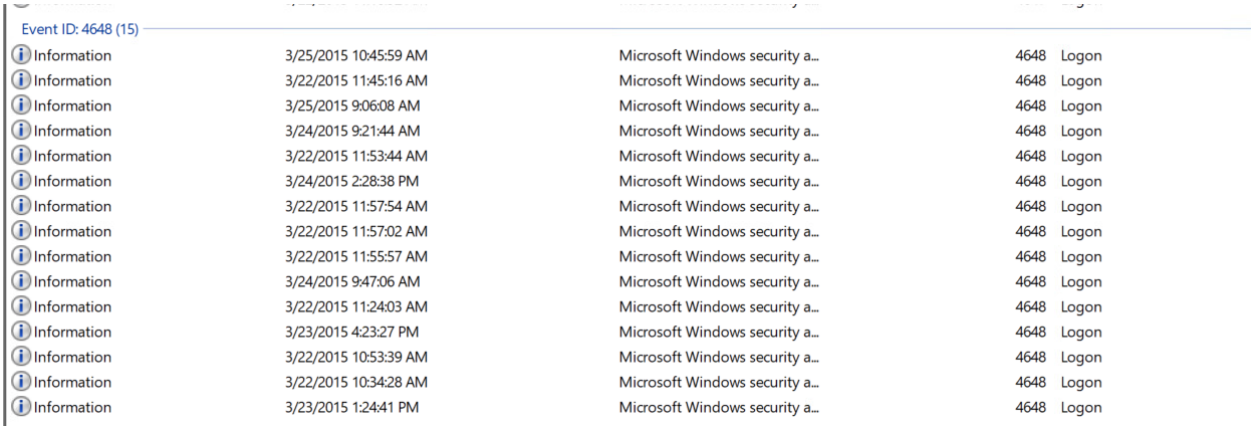
Level	Date and Time	Source	Event ID	Task Category
Event ID: 1100 (8)				
Information	3/22/2015 11:19:42 AM	Eventlog	1100	Service shutdown
Information	3/22/2015 12:00:09 PM	Eventlog	1100	Service shutdown
Information	3/22/2015 11:28:28 AM	Eventlog	1100	Service shutdown
Information	3/23/2015 5:02:59 PM	Eventlog	1100	Service shutdown
Information	3/24/2015 5:07:26 PM	Eventlog	1100	Service shutdown
Information	3/25/2015 6:18:29 AM	Eventlog	1100	Service shutdown
Information	3/25/2015 11:31:00 AM	Eventlog	1100	Service shutdown
Information	3/22/2015 10:38:16 AM	Eventlog	1100	Service shutdown

- Event ID 4624: Successful Logon



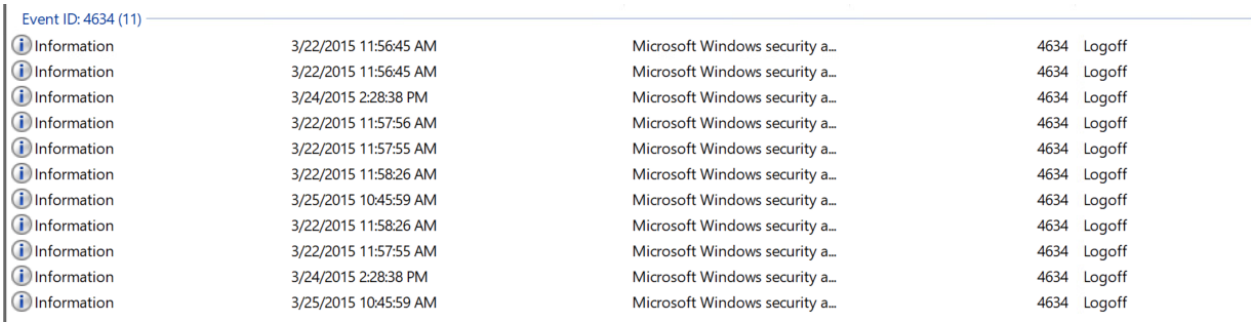
Event ID: 4624 (141)				
Information	3/23/2015 1:24:24 PM	Microsoft Windows security a...	4624	Logon
Information	3/25/2015 6:19:46 AM	Microsoft Windows security a...	4624	Logon
Information	3/23/2015 1:24:24 PM	Microsoft Windows security a...	4624	Logon
Information	3/23/2015 1:24:24 PM	Microsoft Windows security a...	4624	Logon
Information	3/23/2015 1:24:25 PM	Microsoft Windows security a...	4624	Logon
Information	3/23/2015 1:24:26 PM	Microsoft Windows security a...	4624	Logon
Information	3/25/2015 6:33:14 AM	Microsoft Windows security a...	4624	Logon
Information	3/25/2015 6:33:16 AM	Microsoft Windows security a...	4624	Logon
Information	3/23/2015 1:24:24 PM	Microsoft Windows security a...	4624	Logon
Information	3/25/2015 10:57:18 AM	Microsoft Windows security a...	4624	Logon
Information	3/23/2015 1:24:23 PM	Microsoft Windows security a...	4624	Logon
Information	3/25/2015 6:19:46 AM	Microsoft Windows security a...	4624	Logon
Information	3/22/2015 11:57:54 AM	Microsoft Windows security a...	4624	Logon
Information	3/22/2015 11:57:54 AM	Microsoft Windows security a...	4624	Logon
Information	3/22/2015 11:55:57 AM	Microsoft Windows security a...	4624	Logon
Information	3/25/2015 6:19:30 AM	Microsoft Windows security a...	4624	Logon
Information	3/25/2015 6:19:46 AM	Microsoft Windows security a...	4624	Logon
Information	3/22/2015 11:57:02 AM	Microsoft Windows security a...	4624	Logon
Information	3/22/2015 11:57:02 AM	Microsoft Windows security a...	4624	Logon
Information	3/23/2015 4:01:01 PM	Microsoft Windows security a...	4624	Logon
Information	3/22/2015 10:34:28 AM	Microsoft Windows security a...	4624	Logon
Information	3/22/2015 10:34:28 AM	Microsoft Windows security a...	4624	Logon

- Event ID 4648: Logon Attempt Using Explicit Credentials



Event ID: 4648 (15)				
Information	3/25/2015 10:45:59 AM	Microsoft Windows security a...	4648	Logon
Information	3/22/2015 11:45:16 AM	Microsoft Windows security a...	4648	Logon
Information	3/25/2015 9:06:08 AM	Microsoft Windows security a...	4648	Logon
Information	3/24/2015 9:21:44 AM	Microsoft Windows security a...	4648	Logon
Information	3/22/2015 11:53:44 AM	Microsoft Windows security a...	4648	Logon
Information	3/24/2015 2:28:38 PM	Microsoft Windows security a...	4648	Logon
Information	3/22/2015 11:57:54 AM	Microsoft Windows security a...	4648	Logon
Information	3/22/2015 11:57:02 AM	Microsoft Windows security a...	4648	Logon
Information	3/22/2015 11:55:57 AM	Microsoft Windows security a...	4648	Logon
Information	3/24/2015 9:47:06 AM	Microsoft Windows security a...	4648	Logon
Information	3/22/2015 11:24:03 AM	Microsoft Windows security a...	4648	Logon
Information	3/23/2015 4:23:27 PM	Microsoft Windows security a...	4648	Logon
Information	3/22/2015 10:53:39 AM	Microsoft Windows security a...	4648	Logon
Information	3/22/2015 10:34:28 AM	Microsoft Windows security a...	4648	Logon
Information	3/23/2015 1:24:41 PM	Microsoft Windows security a...	4648	Logon

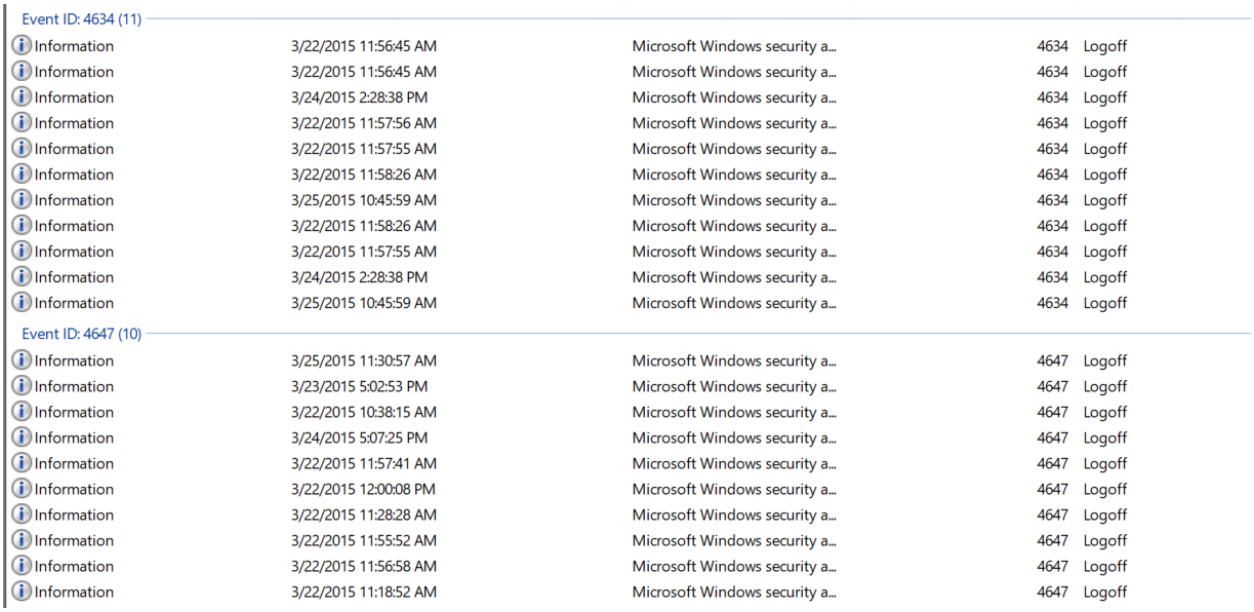
- Event ID 4634: Logoff



Event ID: 4634 (11)

Information	3/22/2015 11:56:45 AM	Microsoft Windows security a...	4634	Logoff
Information	3/22/2015 11:56:45 AM	Microsoft Windows security a...	4634	Logoff
Information	3/24/2015 2:28:38 PM	Microsoft Windows security a...	4634	Logoff
Information	3/22/2015 11:57:56 AM	Microsoft Windows security a...	4634	Logoff
Information	3/22/2015 11:57:55 AM	Microsoft Windows security a...	4634	Logoff
Information	3/22/2015 11:58:26 AM	Microsoft Windows security a...	4634	Logoff
Information	3/25/2015 10:45:59 AM	Microsoft Windows security a...	4634	Logoff
Information	3/22/2015 11:58:26 AM	Microsoft Windows security a...	4634	Logoff
Information	3/22/2015 11:57:55 AM	Microsoft Windows security a...	4634	Logoff
Information	3/24/2015 2:28:38 PM	Microsoft Windows security a...	4634	Logoff
Information	3/25/2015 10:45:59 AM	Microsoft Windows security a...	4634	Logoff

- Event ID 4647: User Initiated Logoff



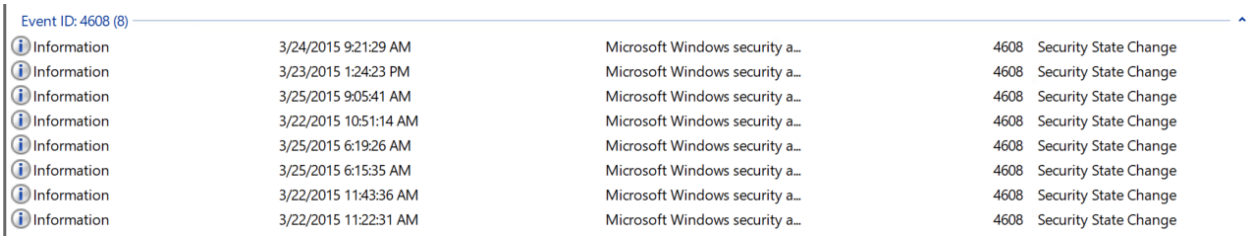
Event ID: 4634 (11)

Information	3/22/2015 11:56:45 AM	Microsoft Windows security a...	4634	Logoff
Information	3/22/2015 11:56:45 AM	Microsoft Windows security a...	4634	Logoff
Information	3/24/2015 2:28:38 PM	Microsoft Windows security a...	4634	Logoff
Information	3/22/2015 11:57:56 AM	Microsoft Windows security a...	4634	Logoff
Information	3/22/2015 11:57:55 AM	Microsoft Windows security a...	4634	Logoff
Information	3/22/2015 11:58:26 AM	Microsoft Windows security a...	4634	Logoff
Information	3/25/2015 10:45:59 AM	Microsoft Windows security a...	4634	Logoff
Information	3/22/2015 11:58:26 AM	Microsoft Windows security a...	4634	Logoff
Information	3/22/2015 11:57:55 AM	Microsoft Windows security a...	4634	Logoff
Information	3/24/2015 2:28:38 PM	Microsoft Windows security a...	4634	Logoff
Information	3/25/2015 10:45:59 AM	Microsoft Windows security a...	4634	Logoff

Event ID: 4647 (10)

Information	3/25/2015 11:30:57 AM	Microsoft Windows security a...	4647	Logoff
Information	3/23/2015 5:02:53 PM	Microsoft Windows security a...	4647	Logoff
Information	3/22/2015 10:38:15 AM	Microsoft Windows security a...	4647	Logoff
Information	3/24/2015 5:07:25 PM	Microsoft Windows security a...	4647	Logoff
Information	3/22/2015 11:57:41 AM	Microsoft Windows security a...	4647	Logoff
Information	3/22/2015 12:00:08 PM	Microsoft Windows security a...	4647	Logoff
Information	3/22/2015 11:28:28 AM	Microsoft Windows security a...	4647	Logoff
Information	3/22/2015 11:55:52 AM	Microsoft Windows security a...	4647	Logoff
Information	3/22/2015 11:56:58 AM	Microsoft Windows security a...	4647	Logoff
Information	3/22/2015 11:18:52 AM	Microsoft Windows security a...	4647	Logoff

- Event ID 4608: Windows Is Starting Up



Event ID: 4608 (8)

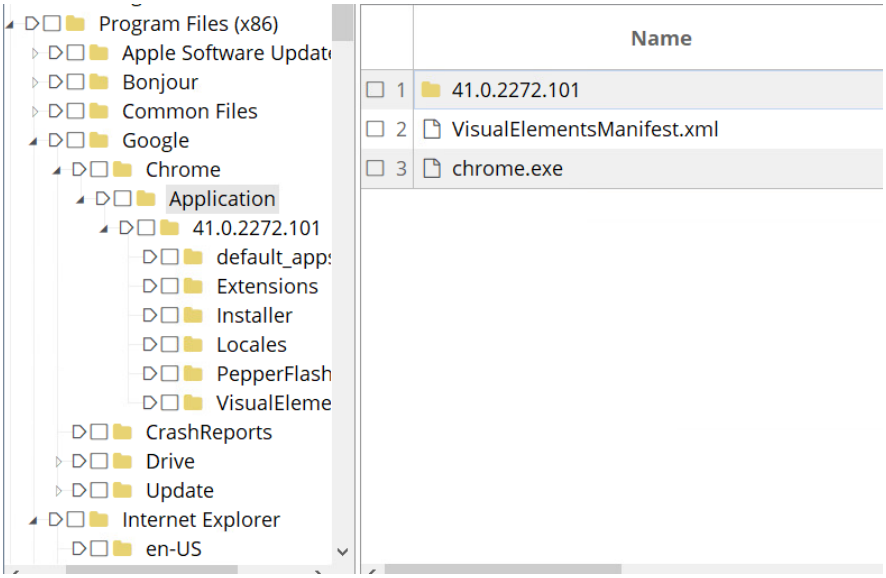
Information	3/24/2015 9:21:29 AM	Microsoft Windows security a...	4608	Security State Change
Information	3/23/2015 1:24:23 PM	Microsoft Windows security a...	4608	Security State Change
Information	3/25/2015 9:05:41 AM	Microsoft Windows security a...	4608	Security State Change
Information	3/22/2015 10:51:14 AM	Microsoft Windows security a...	4608	Security State Change
Information	3/25/2015 6:19:26 AM	Microsoft Windows security a...	4608	Security State Change
Information	3/25/2015 6:15:35 AM	Microsoft Windows security a...	4608	Security State Change
Information	3/22/2015 11:43:36 AM	Microsoft Windows security a...	4608	Security State Change
Information	3/22/2015 11:22:31 AM	Microsoft Windows security a...	4608	Security State Change

13. What web browsers were used?

Answer: The web browsers used were “Google Chrome” and “Internet Explorer”

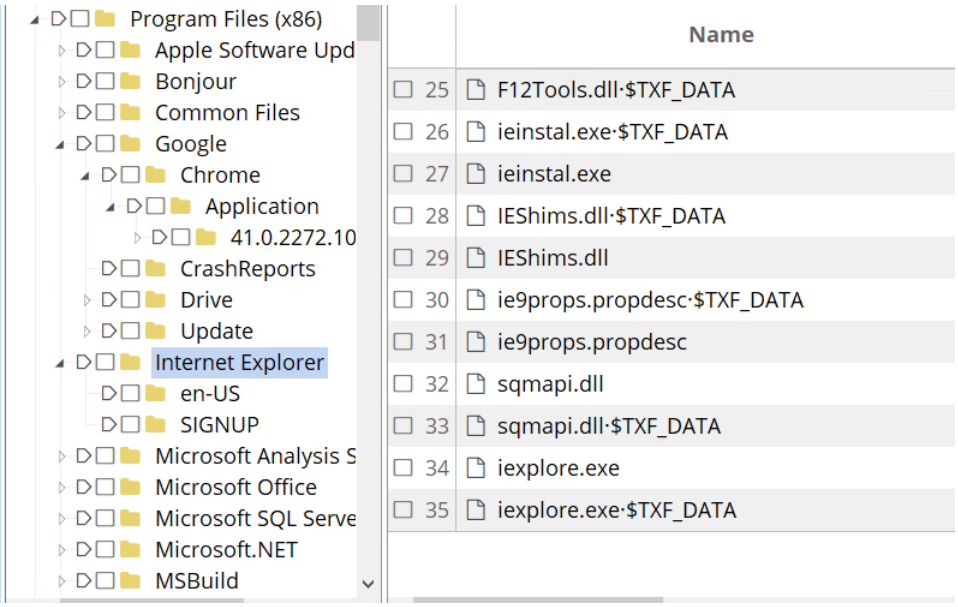
Path for Chrome: Data_Leak\cfreds_2015_data_leakage_pc\D\Program Files (x86)\Google\Chrome\Application\chrome.exe

Evidence:



Path for Internet Explore: Data_Leak\cfreds_2015_data_leakage_pc\D\Program Files (x86)\Internet Explorer\iexplore.exe

Evidence:



14. Identify directory/file paths related to the web browser history.

Answer:

- **Google Chrome**:

Serial Number	**Artifact Name**	**Path**
1	History	Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\AppData\Local\Google\Chrome\User Data\Default\History
2	Cookies	Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\AppData\Local\Google\Chrome\User Data\Default\Cookies
3	Cookies	Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\AppData\Local\Google\Chrome\User Data\Default\ Cookies
4	Last Tabs	Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\AppData\Local\Google\Chrome\User Data\Default\Last Tabs
5	Current Tabs	Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\AppData\Local\Google\Chrome\User Data\Default\Current Tabs
6	Visited Links	Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\AppData\Local\Google\Chrome\User Data\Default\Visited Links
7	Cache	Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\AppData\Local\Google\Chrome\User Data\Default\Cache
8	GPUCache	Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\AppData\Local\Google\Chrome\User Data\Default\GPUCache
9	History Provider Cache	Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\AppData\Local\Google\Chrome\User Data\Default\History Provider Cache

15. What websites were the suspect accessing? (Timestamp, URL…)

Answer: This data has been taken from the history.db file from the google chrome folder located in:
Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\AppData\Local\Google\Chrome\User Data\Default\History.db for google chrome and from the History.IE5 file of internet explorer:
Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\AppData\Local\Microsoft\Windows\History\History.IE5\MSHist012015031620150323

URL	Browser
http://windows.microsoft.com/en-us/internet-explorer/ie-11-worldwide-languages	Download Internet Explorer 11 (Offline installer) - Internet Explorer
https://www.google.com/chrome/browser/thankyou.html?brand=CHNG&platform=win&clickonceinstalled=1	Chrome Browser
https://www.google.com/search?hl=en&source=hp&q=internet+explorer+11&gbv=2&oq=internet+explorer+11&gs_l=heirloom-hp.3..0l10.5163.7893.0.9562.20.13.0.7.7.0.156.1110.11j2.13.0.msedr...0...1ac.1.34.heirloom-hp..0.20.1250.5j7Xm44tv5w	internet explorer 11 - Google Search
http://www.msn.com/?ocid=iehp	msn
http://windows.microsoft.com/en-us/internet-explorer/download-ie	Download Web Browser - Internet Explorer
http://windows.microsoft.com/en-US/internet-explorer/products/ie-8/welcome	
http://go.microsoft.com/fwlink/?LinkID=121792	
http://windows.microsoft.com/en-us/internet-explorer/ie-8-welcome	Your browser has been upgraded - Microsoft Windows

https://www.google.com/?gws_rd=ssl	Google
http://www.google.com/url?url=http://windows.microsoft.com/en-us/internet-explorer/download-ie&rct=j&frm=1&q=&esrc=s&sa=U&ei=6ykQVZWLGbeJsQT7goDACg&ved=0CB8QFjAA&usg=AFQjCNEwsIz17kY-jTXbaWPcQDfBbVEi7A	
https://www.google.com/webhp?hl=en	Google
https://www.google.com/chrome/index.html?hl=en&brand=CHNG&utm_source=en-hpp&utm_medium=hpp&utm_campaign=en	Chrome
http://go.microsoft.com/fwlink/?LinkId=69157	
http://tools.google.com/chrome/intl/en/welcome.html	Getting Started
https://www.google.com/intl/en/chrome/browser/welcome.html	Getting Started
https://www.google.com/	Google
http://www.bing.com/	Bing
https://www.google.com/#q=outlook+2013+settings	Google
https://support.office.com/en-nz/article/Set-up-email-in-Outlook-2010-or-Outlook-2013-for-Office-365-or-Exchange-based-accounts-6e27792a-9267-4aa4-8bb6-c84ef146101b	Set up email in Outlook 2010 or Outlook 2013 for Office 365 or Exchange-based accounts
https://www.google.com/webhp?hl=en#q=Emmy+Noether&oi=ddle&ct=emmy-noethers-133rd-birthday-5681045017985024-hp&hl=en	Emmy Noether - Google Search
https://www.google.com/webhp?hl=en#hl=en&q=data+leakage+methods	data leakage methods - Google Search
http://www.sans.org/reading-room/whitepapers/awareness/data-leakage-threats-mitigation_1931	
http://www.sans.org/reading-room/whitepapers/awareness/data-leakage-threats-mitigation-1931	

https://www.google.com/webhp?hl=en#hl=en&q=leaking+confidential+information	leaking confidential information - Google Search
https://www.google.com/webhp?hl=en#q=leaking+confidential+information&hl=en&start=10	
https://www.google.com/webhp?hl=en#q=leaking+confidential+information&hl=en&start=20	
https://www.google.com/webhp?hl=en#hl=en&q=information+leakage+cases	information leakage cases - Google Search
http://www.emirates247.com/business/technology/top-5-sources-leaking-personal-data-2015-03-13-1.584027	Top 5 sources leaking personal data - Emirates 24|7
https://www.google.com/webhp?hl=en#q=information+leakage+cases&hl=en	
https://www.google.com/search?q=information+leakage+cases&hl=en&biw=950&bih=499&site=webhp&source=lnms&tbm=isch&sa=X&ei=21UQVb20Eu-HsQTJ5IDAAQ&ved=0CAgQ_AUoAw	information leakage cases - Google Search
https://www.google.com/search?q=information+leakage+cases&hl=en&biw=950&bih=499&site=webhp&tbm=vid&source=lnms&sa=X&ei=3VUQVYH3FMO1sQTf1YGwBw&ved=0CAoQ_AUoBA&dpr=1	information leakage cases - Google Search
https://www.google.com/search?q=information+leakage+cases&hl=en&biw=950&bih=499&site=webhp&tbm=vid&source=lnms&sa=X&ei=3VUQVYH3FMO1sQTf1YGwBw&ved=0CAoQ_AUoBA&dpr=1#q=information+leakage+cases&hl=en	intellectual property theft - Google Search
http://www.mediapost.com/publications/article/205047/google-to-settle-data-leakage-case-for-85-mill.html?edition=	Google To Settle 'Data Leakage' Case For $8.5 Million 07/23/2013
https://www.google.com/search?q=information+leakage+cases&hl=en&biw=950&bih=499&site=webhp&tbm=vid&source=lnms&sa=X&ei=3V	how to leak a secret - Google Search

UQVYH3FMO1sQTf1YGwBw&ved=0CAoQ_AUoBA&dpr=1#hl=en&q=intellectual+property+theft	
http://www.fbi.gov/about-us/investigate/white_collar/ipr/ipr	FBI â€" Intellectual Property Theft
http://en.wikipedia.org/wiki/Intellectual_property	Intellectual property - Wikipedia, the free encyclopedia
https://www.google.com/search?q=information+leakage+cases&hl=en&biw=950&bih=499&site=webhp&tbm=vid&source=lnms&sa=X&ei=3VUQVYH3FMO1sQTf1YGwBw&ved=0CAoQ_AUoBA&dpr=1#hl=en&q=how+to+leak+a+secret	cloud storage - Google Search
http://research.microsoft.com/en-us/um/people/yael/publications/2001-leak_secret.pdf	
https://www.google.com/search?q=information+leakage+cases&hl=en&biw=950&bih=499&site=webhp&tbm=vid&source=lnms&sa=X&ei=3VUQVYH3FMO1sQTf1YGwBw&ved=0CAoQ_AUoBA&dpr=1#hl=en&q=cloud+storage	
http://en.wikipedia.org/wiki/Cloud_storage	Cloud storage - Wikipedia, the free encyclopedia
http://www.pcadvisor.co.uk/test-centre/internet/3506734/best-cloud-storage-dropbox-google-drive-onedrive-icloud/	7 best cloud storage services 2015: Dropbox vs Google Drive - PC Advisor
https://www.google.com/search?q=information+leakage+cases&hl=en&biw=950&bih=499&site=webhp&tbm=vid&source=lnms&sa=X&ei=3VUQVYH3FMO1sQTf1YGwBw&ved=0CAoQ_AUoBA&dpr=1#hl=en&q=digital+forensics	digital forensics - Google Search
http://en.wikipedia.org/wiki/Digital_forensics	Digital forensics - Wikipedia, the

	free encyclopedia
http://nij.gov/topics/forensics/evidence/digital/pages/welcome.aspx	Digital Evidence and Forensics | National Institute of Justice
http://nij.gov/Pages/PageNotFoundError.aspx?requestUrl=http://nij.gov/topics/forensics/evidence/digital/standards/pages/welcome.aspx	NIJ Home Page Page not found (404 Error)
http://nij.gov/topics/forensics/evidence/digital/analysis/pages/welcome.aspx	Digital Evidence Analysis Tools | National Institute of Justice
https://www.google.com/search?q=information+leakage+cases&hl=en&biw=950&bih=499&site=webhp&tbm=vid&source=lnms&sa=X&ei=3VUQVYH3FMO1sQTf1YGwBw&ved=0CAoQ_AUoBA&dpr=1#hl=en&q=how+to+delete+data	how to delete data - Google Search
https://www.google.com/search?q=information+leakage+cases&hl=en&biw=950&bih=499&site=webhp&tbm=vid&source=lnms&sa=X&ei=3VUQVYH3FMO1sQTf1YGwBw&ved=0CAoQ_AUoBA&dpr=1#hl=en&q=anti-forensics	anti-forensics - Google Search
http://forensicswiki.org/wiki/Anti-forensic_techniques	Anti-forensic techniques - ForensicsWiki
https://www.google.com/search?q=information+leakage+cases&hl=en&biw=950&bih=499&site=webhp&tbm=vid&source=lnms&sa=X&ei=3VUQVYH3FMO1sQTf1YGwBw&ved=0CAoQ_AUoBA&dpr=1#hl=en&q=how+to+recover+data	how to recover data - Google Search
https://www.google.com/search?q=information+leakage+cases&hl=en&biw=950&bih=499&site=webhp&tbm=vid&source=lnms&sa=X&ei=3VUQVYH3FMO1sQTf1YGwBw&ved=0CAoQ_AUoBA&dpr=1#hl=en&q=data+recovery+tools	information leakage cases - Google Search
http://en.wikipedia.org/wiki/List_of_data_recovery_software	List of data recovery

	software - Wikipedia, the free encyclopedia
http://www.forensicswiki.org/wiki/Tools:Data_Recovery	Tools:Data Recovery - ForensicsWiki
https://www.google.com/webhp?hl=en#hl=en&q=google	
https://www.google.com/webhp?hl=en#hl=en&q=apple+icloud	apple icloud - Google Search
https://www.apple.com/icloud/	Apple - iCloud - Everything you love, everywhere you go.
https://www.apple.com/icloud/setup/pc.html	Apple - iCloud - Learn how to set up iCloud on all your devices.
http://support.apple.com/kb/DL1455?locale=en_US	iCloud for Windows
https://support.apple.com/kb/DL1455?locale=en_US	iCloud for Windows
https://www.google.com/webhp?hl=en#hl=en&q=google+drive	google drive - Google Search
https://www.google.com/drive/	Google Drive - Cloud Storage & File Backup for Photos, Docs & More
https://www.google.com/drive/download/	Download Google Drive - Free Cloud Storage

https://tools.google.com/dlpage/drive/index.html?hl=en#eula	Download Google Drive Now â€“ For Free
https://tools.google.com/dlpage/drive/thankyou.html?hl=en	Google Drive
https://news.google.com/nwshp?hl=en&tab=wn&ei=xnARVdWfPPLjsASdgIKoAw&ved=0CAUQqS4oBQ	Google News
https://news.google.com/news/section?pz=1&cf=all&ned=us&topic=w&siidp=0b2226a6a5dab3b27ee85fc5e8d21f28f01e	World
https://news.google.com/news/section?pz=1&cf=all&ned=us&topic=tc&siidp=e6116f8175cb189b8dd7fd58ef6bc922ec04	Technology
https://news.google.com/news?pz=1&cf=all&ned=us&siidp=0c33ef04190b3734a22c5bae18801ff1041e	Google News
http://www.cbsnews.com/news/germanwings-flight-9525-pulverized-plane-parts-rough-mountain-terrain/	Germanwings Flight 9525: "Everything is pulverized" - CBS News
https://news.google.com/news/section?pz=1&cf=all&ned=us&topic=w&siidp=538c61c825aba06be7485be747a619778015	World
https://news.google.com/news?pz=1&cf=all&ned=us&siidp=f206159a77e2be8861b5231ddc055443b303	Google News
https://news.google.com/news/section?pz=1&cf=all&ned=us&topic=s&siidp=545d9217fe5452fcfbcbe251400793f398ac	Sports
https://news.google.com/news?pz=1&hl=en&tab=nn	Google News
https://www.google.com/#q=security+checkpoint+cd-r	security checkpoint cd-r - Google Search

16. List all search keywords using web browsers. (Timestamp, URL, keyword…)

Answer:

17. List all user keywords at the search bar in Windows Explorer. (Timestamp, Keyword)

Answer: In this screenshot, we can see the **WordWheelQuery** registry key located under Software\Microsoft\Windows\CurrentVersion\Explorer\ in the NTUSER.DAT file. This registry key records the search terms that a user has entered in the Windows Explorer search bar, which is a valuable source of information for digital forensics investigators to trace user search activity on a system.

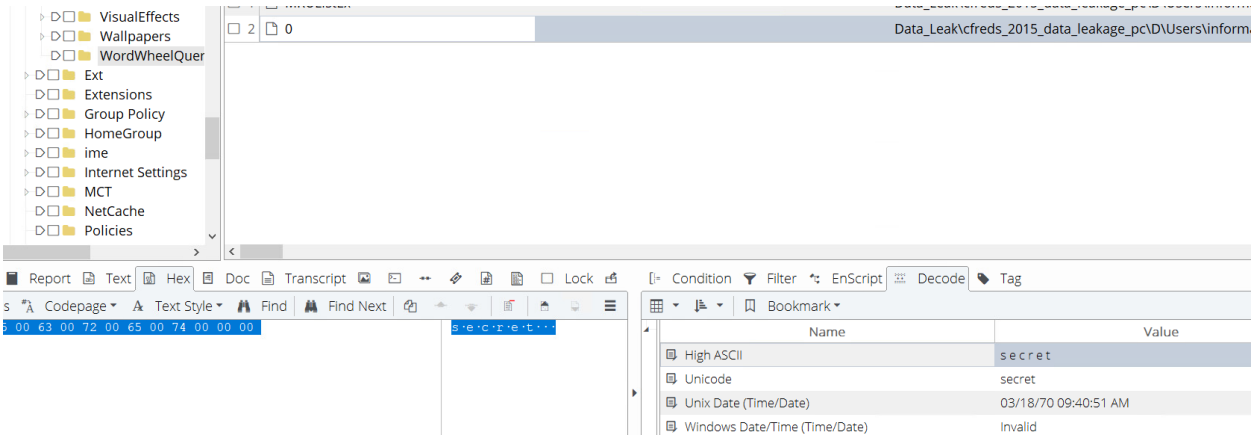
Key Observations:

1. **Registry Path**:The path in the registry, Software\Microsoft\Windows\CurrentVersion\Explorer\WordWheelQuery, is where Windows stores recent search entries.

2. **Search Keyword**: Under WordWheelQuery\0, the keyword secret appears, which indicates that the user searched for "secret" in Windows Explorer.

3. **Timestamp**:There is a timestamp field that shows 03/18/70 09:40:51 AM. However, this date seems invalid or corrupted, likely due to issues in recording or interpreting the timestamp data.Some forensic tools may not accurately parse timestamps from certain registry entries, or it could indicate that no timestamp was associated with this search term.

4. **Hex View**:The hex representation at the bottom shows the ASCII characters for "secret," which confirms the stored search keyword.

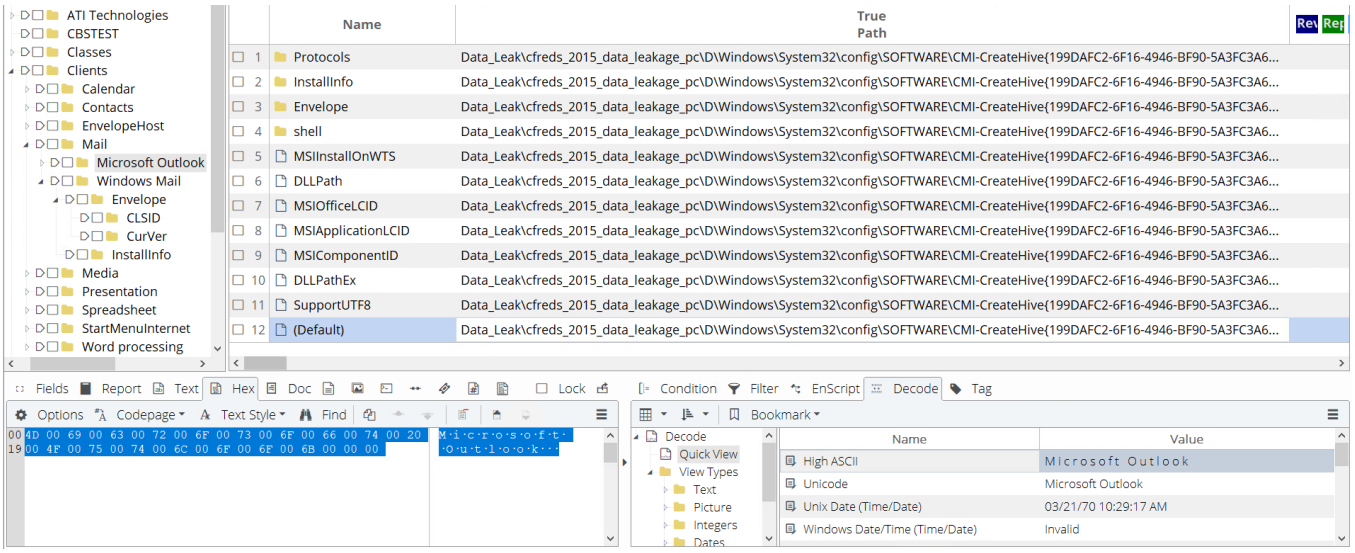


18. What application was used for e-mail communication?

Answer: The application used for e-mail communication is “Mircosoft Outlook.” The ***default*** registry key within the **SOFTWARE** registry hive specifies the default email client for the user. The Default value here, within this key contains the name of the email program "Microsoft Outlook".

Path:
Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config\SOFTWARE\CMI-CreateHive{199DAFC2-6F16-4946-BF90-5A3FC3A60902}\Clients\Mail\Microsoft Outlook\(Default)

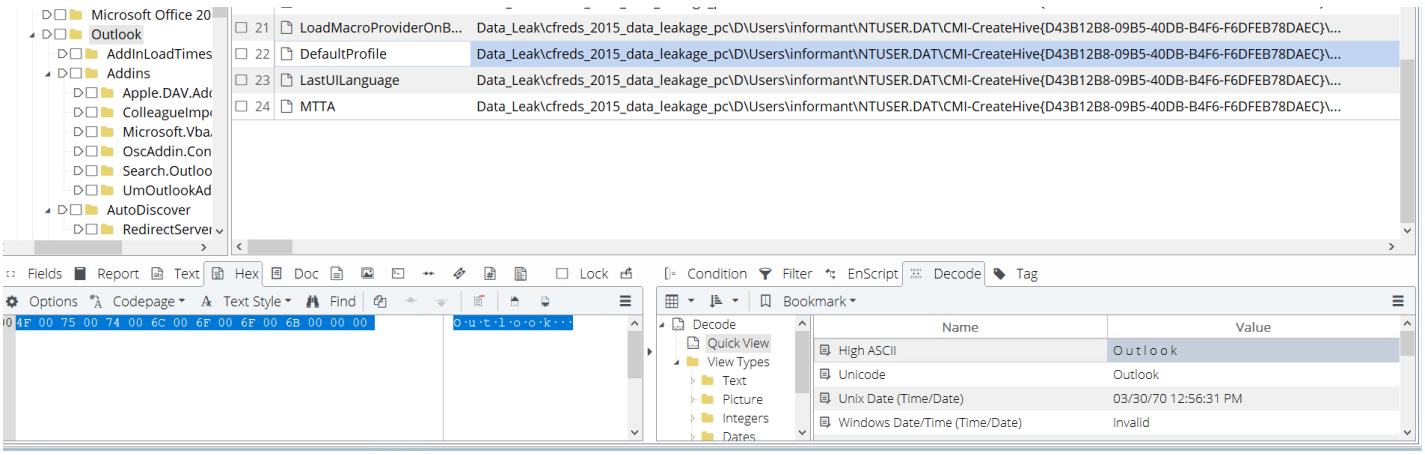
Evidence:



Outlook is also the default email application in the user profile of the suspect (informant). The file path is of the registry key that stores the name of the default Outlook profile for the user on a Windows system.

Path: Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\NTUSER.DAT\CMI-CreateHive{D43B12B8-09B5-40DB-B4F6-F6DFEB78DAEC}\Software\Microsoft\Office\15.0\Outlook\DefaultProfile

Evidence:



19. Where is the e-mail file located?

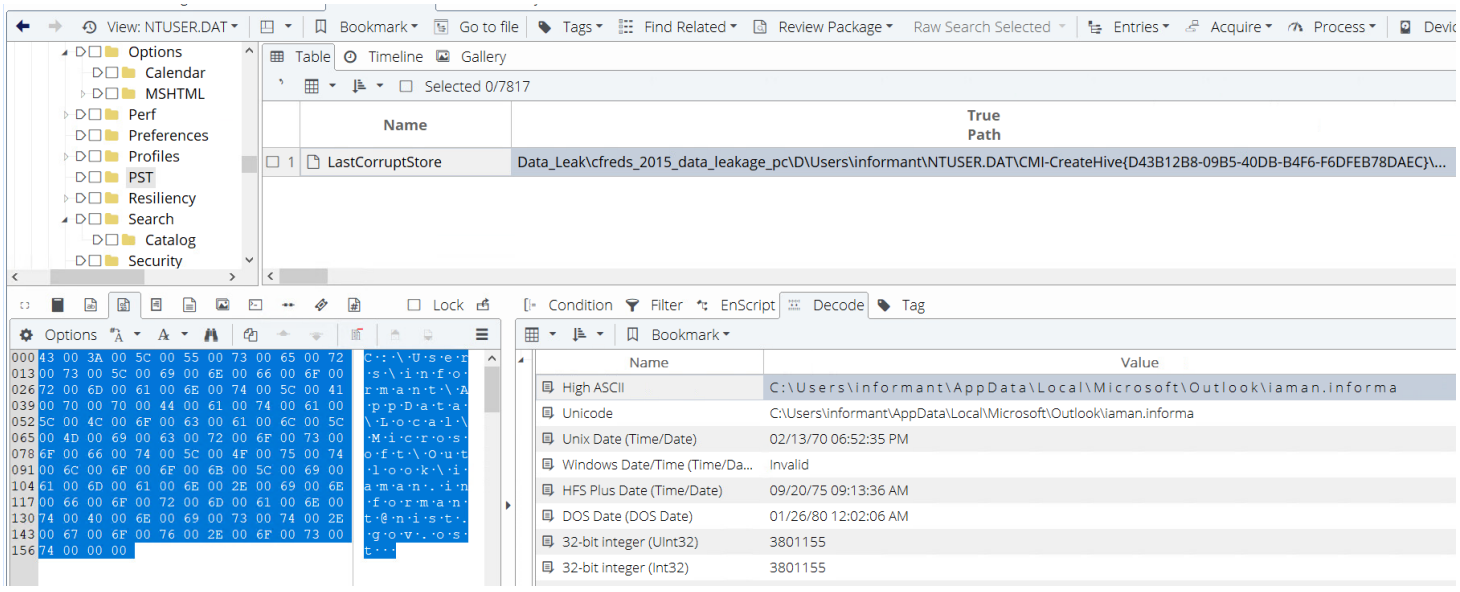
Answer: The file is located at
C:\Users\informant\AppData\Local\Microsoft\Office\iaman.informant@nist.gov.ost

This path points to an OST file, which stands for Offline Storage Table. OST files are utilized by Microsoft Outlook to store a synchronized copy of mailbox data from an Exchange server or other IMAP account. This allows users to access their emails and other Outlook data even when they are offline.

The identified path was extracted from the **LastCorruptStore** registry key within the user's NTUSER.DAT hive. This registry key serves the purpose of storing the location of the last Outlook data file that encountered corruption errors. In this specific instance, the value associated with the LastCorruptStore key indicates that the corrupted file is an OST file named "**iaman.informant@nist.gov.ost**". This file resides within the user's Outlook profile directory.

Path: Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\NTUSER.DAT\CMI-CreateHive{D43B12B8-09B5-40DB-B4F6-F6DFEB78DAEC}\Software\Microsoft\Office\15.0\Outlook\PST\LastCorruptStore

Evidence:



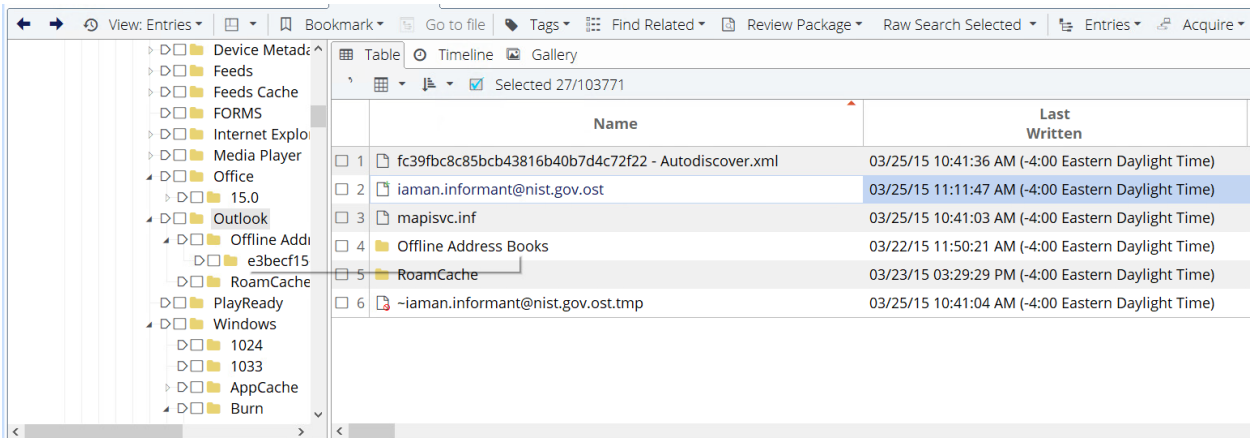
20. What was the e-mail account used by the suspect?

Answer: The email account used by the suspect is **iaman.informant@nist.gov**.

An **Offline Storage Table (OST) file** is an offline copy of a user's mailbox from Microsoft Outlook, allowing access to emails, calendar events, and other data without an internet connection. The naming conventions for OST files depend on the version of Microsoft Outlook and the settings configured by the user or administrator. Here's how they are typically named:

Default Naming Convention: By default, the OST file is named as the **user's email address** or **mailbox alias**. For example, if the email address is user@example.com, the OST file might be named user@example.com.ost.

The file is located at
Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\AppData\Local\Microsoft\Outlook\iaman.informant@nist.gov.ost

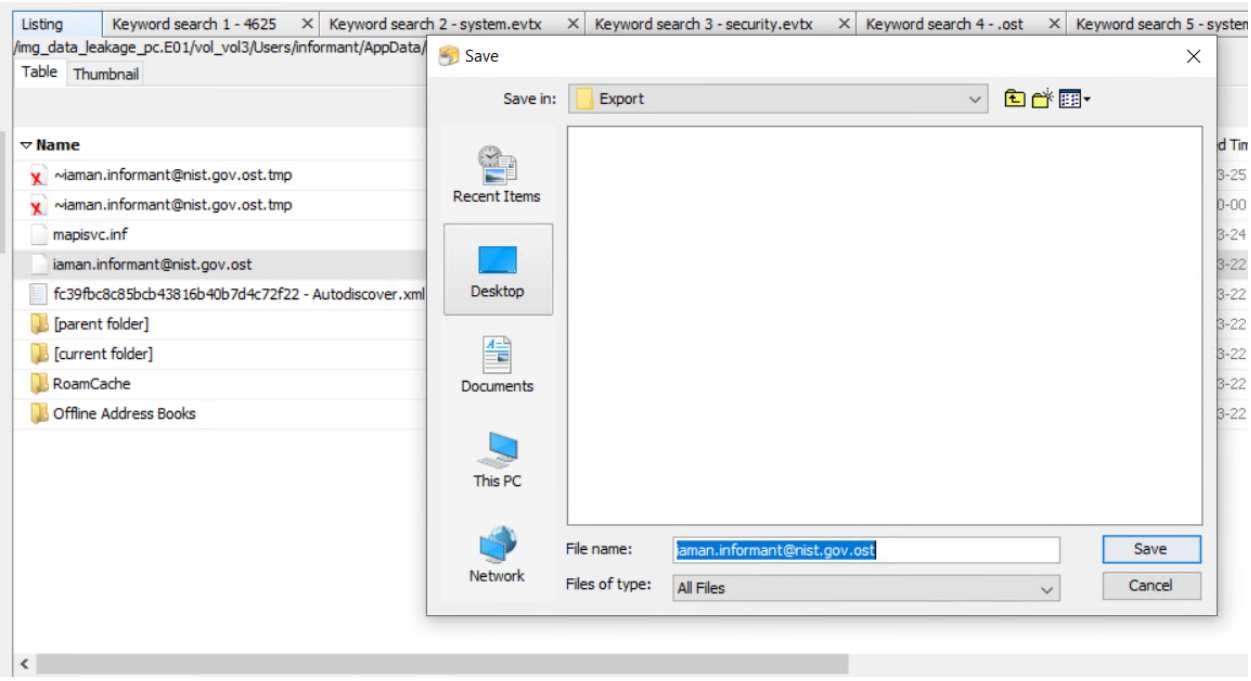


21. List all e-mails of the suspect. If possible, identify deleted e-mails.
    (You can identify the following items: *Timestamp, From, To, Subject, Body, and Attachment*)
    [Hint: just examine the OST file only.]

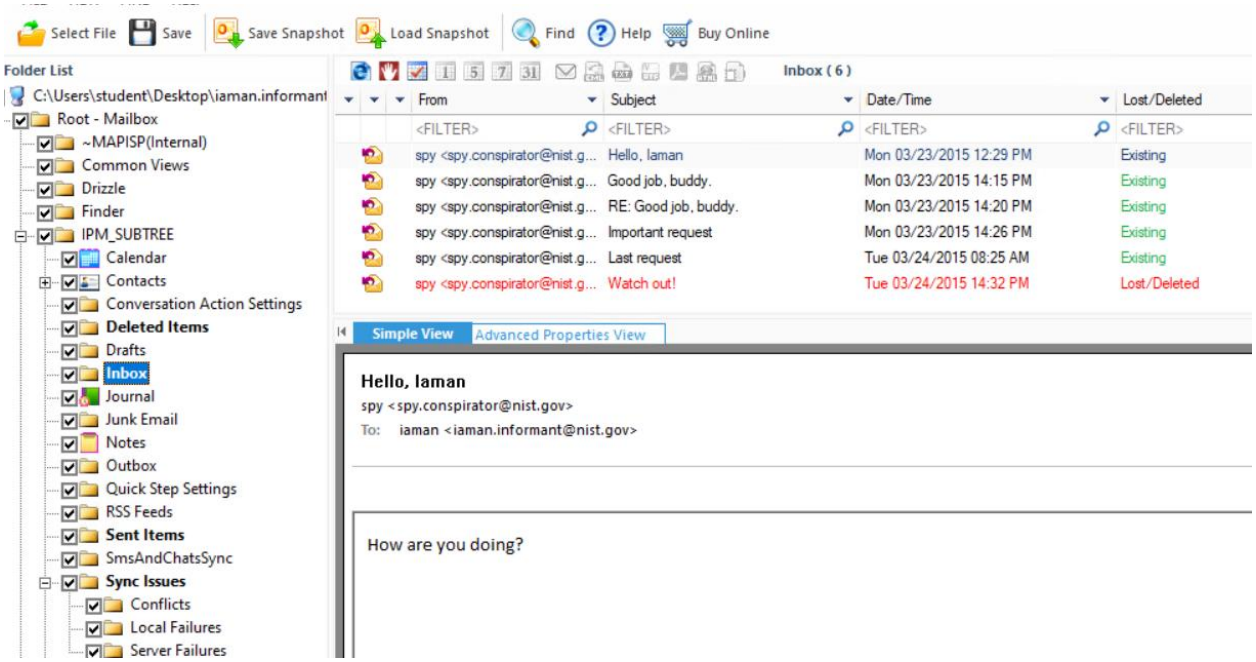
Answer: To analyse the E-mail data like sent emails, deleted emails and inbox, firstly I extracted the OST file and then converted the OST file into a PST file using a tool called "**Kernel for OST to PST - Evaluation Version**." OST files are designed to work with Exchange Server or IMAP accounts, allowing offline access to mailboxes. They function as synchronized copies of the server data. However, OST files are intrinsically linked to the original profile and Exchange server they were created on. This means you can't simply open an OST file on a different computer or in a different Outlook profile.

Converting OST to PST creates a portable, independent copy of the mailbox data. PST files (Personal Storage Table) are not tied to a specific profile or server, making them accessible on any computer with Outlook. This conversion becomes essential when:

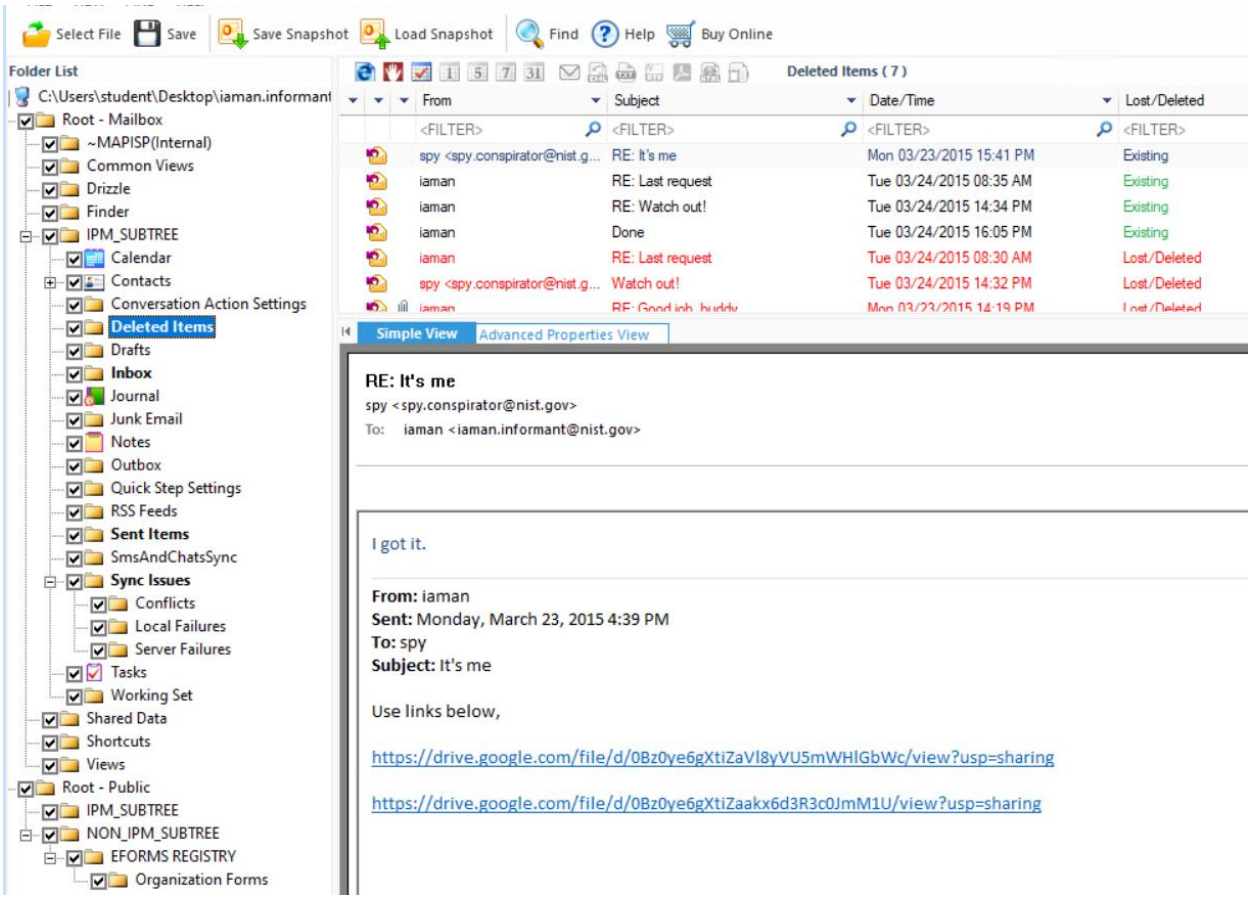
- **Migrating data:** Moving mailboxes to a new computer, profile, or email system.
- **Backing up data:** Creating a standalone backup of the mailbox.
- **Recovering from corruption:** If the OST file is corrupted, converting it to PST can sometimes salvage the data.
- **Accessing data without Exchange:** Viewing OST content when the Exchange server is unavailable, or the user is no longer connected to it.
- The file is located at **Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\AppData\Local\Microsoft\Outlook\iaman.informant@nist.gov.ost**



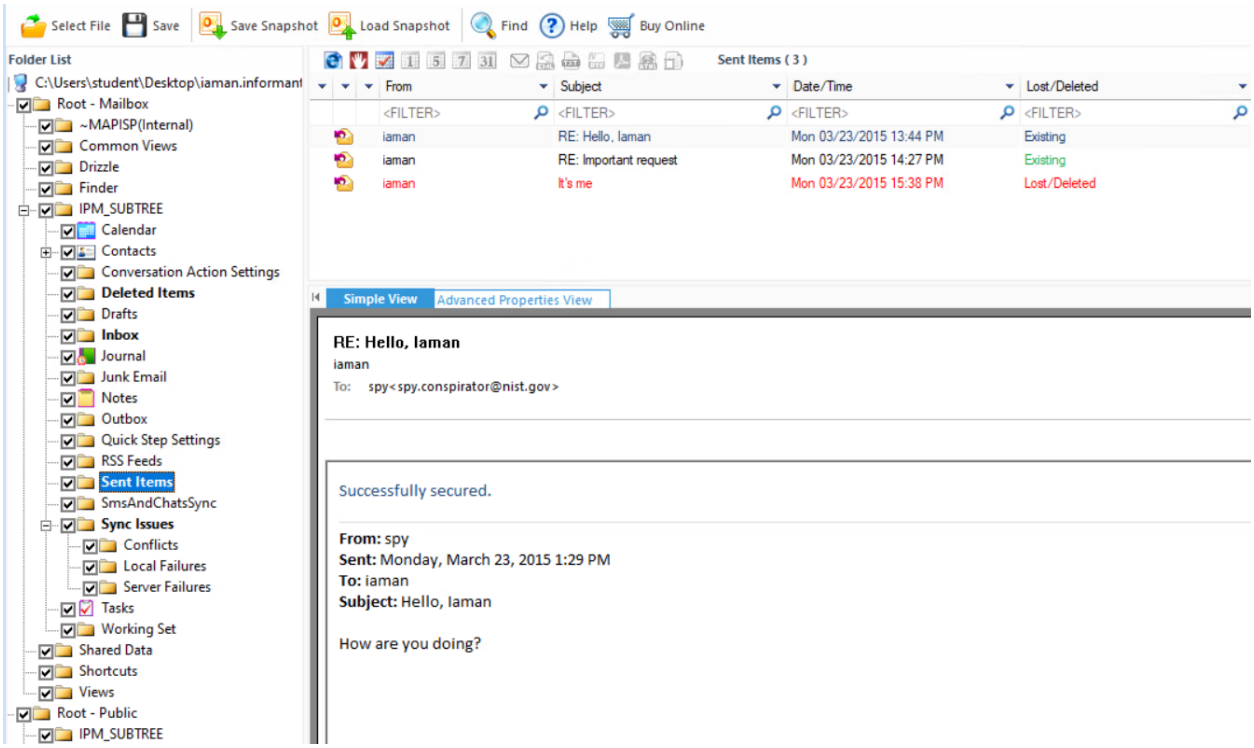
- Inbox emails(6):



- Deleted Emails(7):



- Sent emails(3):



Timestamp	Source	From	To	Subject	Body
23-03-2015 13:29	Inbox	spy.conspirator@nist.gov	iaman.informant@nist.gov	Hello, Iaman	How are you doing?
23-03-2015 14:44	Sent Items	iaman.informant@nist.gov	spy.conspirator@nist.gov	RE: Hello, Iaman	RE: Hello, Iaman
23-03-2015 15:14	Inbox	spy.conspirator@nist.gov	iaman.informant@nist.gov	Good job, buddy.	Good, job. I need a more detailed data about this business.
23-03-2015 15:20	Inbox	spy.conspirator@nist.gov	iaman.informant@nist.gov	RE: Good job, buddy.	Okay, I got it. I'll be in touch. --- **From**: iaman **Sent**: Monday, March 23, 2015 3:19 PM **To**: spy **Subject**: RE: Good job, buddy. This is a sample. --- **From**: spy **Sent**: Monday, March 23, 2015 3:15 PM **To**: iaman **Subject**: Good job, buddy. Good, job. I need a more detailed data about this business.
23-03-2015 15:26	Inbox	spy.conspirator@nist.gov	iaman.informant@nist.gov	Important request	I confirmed it. But I need a more data. Do your best.

23-03-2015 15:27	Sent Items	iaman.informant@nist.gov	spy.conspirator@nist.gov	RE: Important request	Umm..... I need time to think. ---------- **From**: spy **Sent**: Monday, March 23, 2015 3:26 PM **To**: iaman **Subject**: Important request I confirmed it. But, I need a more data. Do your best.
23-03-2015 16:38	Deleted Items	iaman.informant@nist.gov	spy.conspirator@nist.gov	It's me	Use links below, https://drive.google.com/file/d/0Bz0ye6gXtiZaVl8yVU5mWHlGbWc/view?usp=sharing https://drive.google.com/file/d/0Bz0ye6gXtiZaakx6d3R3c0JmM1U/view?usp=sharing
23-03-2015 16:41	Deleted Items	spy.conspirator@nist.gov	iaman.informant@nist.gov	RE: It's me	I got it. ---------- **From**: iaman **Sent**: Monday, March 23, 2015 4:39 PM **To**: spy **Subject**: It's me Use links below,

					https://drive.google.com/file/d/0Bz0ye6gXtiZaVl8yVU5mWHlGbWc/view?usp=sharing https://drive.google.com/file/d/0Bz0ye6gXtiZaakx6d3R3c0JmM1U/view?usp=sharing
24-03-2015 09:25	Inbox	spy.conspirator@nist.gov	iaman.informant@nist.gov	Last request	This is the last request. I want to get the remaining data.
24-03-2015 09:35	Deleted Items	iaman.informant@nist.gov	spy.conspirator@nist.gov	RE: Last request	This is the last time.. --- **From**: spy **Sent**: Tuesday, March 24, 2015 9:34 AM **To**: iaman **Subject**: RE: Last request No problem. U can directly deliver storage devices that stored it. --- **From**: iaman **Sent**: Tuesday, March 24, 2015 9:30 AM **To**: spy **Subject**: RE: Last request Stop it!

					It is very hard to transfer all data over the internet! --- **From**: spy **Sent**: Tuesday, March 24, 2015 9:26 AM **To**: iaman **Subject**: Last request This is the last request. I want to get the remaining data.
24-03-2015 15:34	Deleted Items	iaman.informant@nist.gov	spy.conspirator@nist.gov	RE: Watch out!	I am trying. --- **From**: spy **Sent**: Tuesday, March 24, 2015 3:33 PM **To**: iaman **Subject**: Watch out! USB device may be easily detected. So, try another method.
24-03-2015 17:05	Deleted Items	iaman.informant@nist.gov	spy.conspirator@nist.gov	Done	It's done. See you tomorrow.

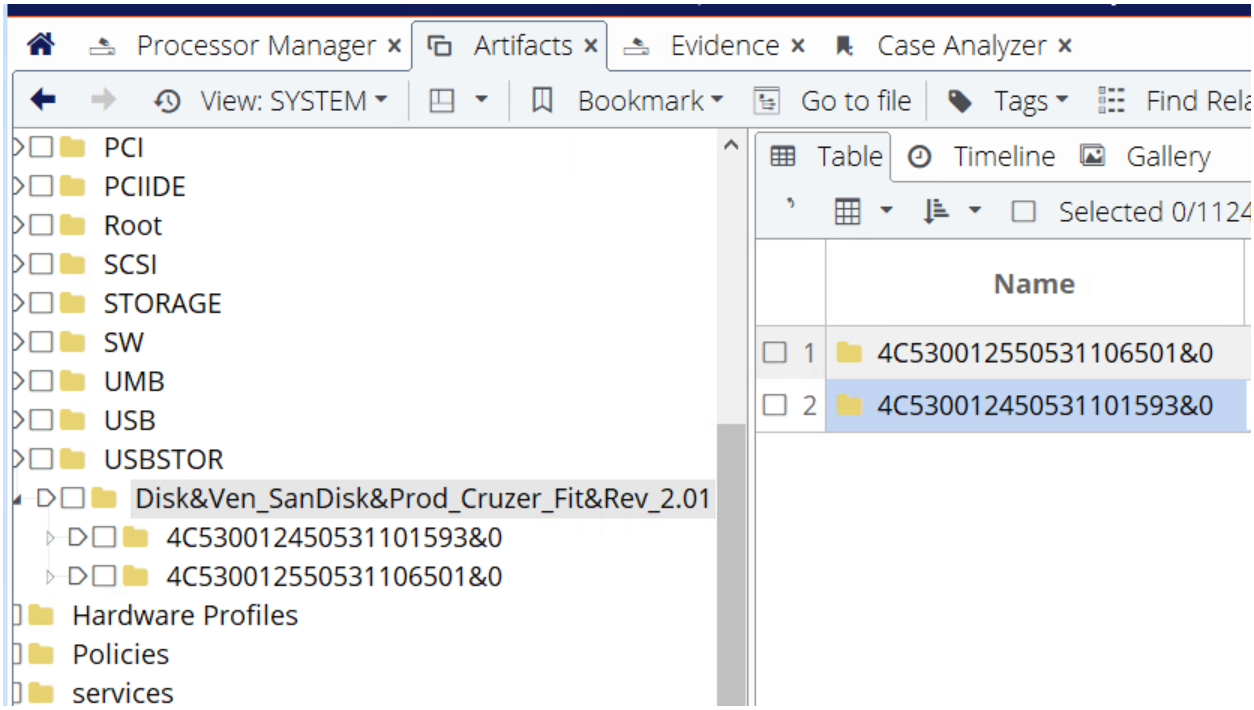
22. List external storage devices attached to PC.

Answer: There are 2 connected external devices to the PC having name "**SanDisk Cruzer Fit USB Device**" and serial number: "**4C530012450531101593&0**" and "**4C530012550531106501&0**"

Selected 0/12 | Constraint | Clear Constraint | Save Selected | Bookmark Selected | About

	Target	Serial #	Device	Friendly Name	Vendor	Product
1	cfreds_2015_data_leakage_pc	4C530012450531101593&0	SanDisk Cruzer Fit USB Device	SanDisk Cruzer Fit USB Device	SanDisk	Cruzer_Fit
2	cfreds_2015_data_leakage_pc	4C530012450531101593&0	SanDisk Cruzer Fit USB Device	SanDisk Cruzer Fit USB Device	SanDisk	Cruzer_Fit
3	cfreds_2015_data_leakage_pc	4C530012450531101593&0	SanDisk Cruzer Fit USB Device	SanDisk Cruzer Fit USB Device	SanDisk	Cruzer_Fit
4	cfreds_2015_data_leakage_pc	4C530012450531101593&0	SanDisk Cruzer Fit USB Device	SanDisk Cruzer Fit USB Device	SanDisk	Cruzer_Fit
5	cfreds_2015_data_leakage_pc	4C530012450531101593&0	SanDisk Cruzer Fit USB Device	SanDisk Cruzer Fit USB Device	SanDisk	Cruzer_Fit
6	cfreds_2015_data_leakage_pc	4C530012450531101593&0	SanDisk Cruzer Fit USB Device	SanDisk Cruzer Fit USB Device	SanDisk	Cruzer_Fit
7	cfreds_2015_data_leakage_pc	4C530012550531106501&0	SanDisk Cruzer Fit USB Device	SanDisk Cruzer Fit USB Device	SanDisk	Cruzer_Fit
8	cfreds_2015_data_leakage_pc	4C530012550531106501&0	SanDisk Cruzer Fit USB Device	SanDisk Cruzer Fit USB Device	SanDisk	Cruzer_Fit
9	cfreds_2015_data_leakage_pc	4C530012550531106501&0	SanDisk Cruzer Fit USB Device	SanDisk Cruzer Fit USB Device	SanDisk	Cruzer_Fit
10	cfreds_2015_data_leakage_pc	4C530012550531106501&0	SanDisk Cruzer Fit USB Device	SanDisk Cruzer Fit USB Device	SanDisk	Cruzer_Fit
11	cfreds_2015_data_leakage_pc	4C530012550531106501&0	SanDisk Cruzer Fit USB Device	SanDisk Cruzer Fit USB Device	SanDisk	Cruzer_Fit
12	cfreds_2015_data_leakage_pc	4C530012550531106501&0	SanDisk Cruzer Fit USB Device	SanDisk Cruzer Fit USB Device	SanDisk	Cruzer_Fit

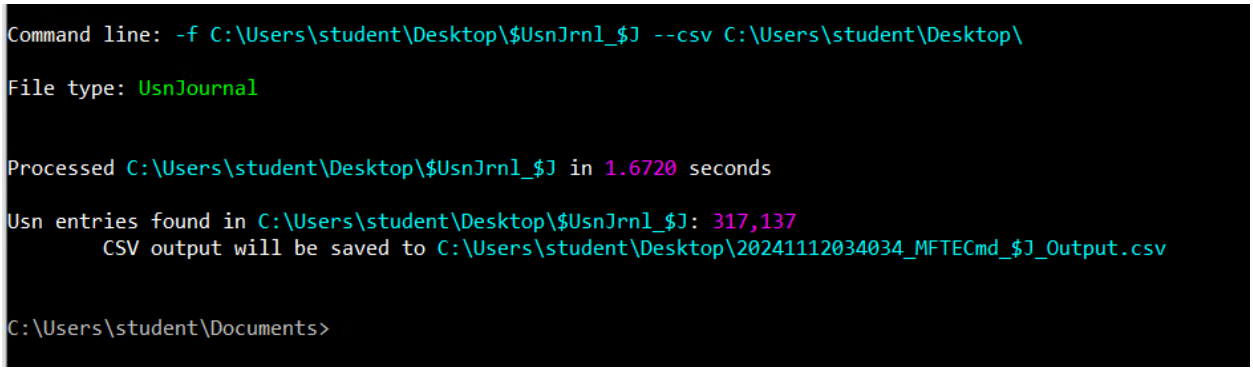
Path: Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config\SYSTEM\CMI-CreateHive{2A7FB991-7BBE-4F9D-B91E-7CB51D4737F5}\ControlSet001\Enum\USBSTOR\Disk&Ven_SanDisk&Prod_Cruzer_Fit&Rev_2.01\4C530012450531101593&0



23. Identify all traces related to ‘renaming’ of files in Windows Desktop.
    (It should be considered only during a date range between 2015-03-23 and 2015-03-24.)
    [Hint: the parent directories of renamed files were deleted and their MFT entries were also overwritten. Therefore, you may not be able to find their full paths.]

Answer: Initially extracted **$UsnJrnl** and then converted it into a csv file for analysis. For conversion, MFTECMd.exe tool was used. The $UsnJrnl file in NTFS is a detailed log of file system changes, crucial for forensic investigations. It records actions like file creation, deletion, renaming, and modifications, aiding in data recovery, timeline reconstruction, and malware analysis. Each record includes timestamps, filenames, reasons for change, and other attributes. To identify renamed files, even with missing parent directories, investigators can filter the journal by date, identify "rename" events, and extract relevant information like filenames and timestamps.

Path: Data_Leak\cfreds_2015_data_leakage_pc\D\$Extend\$UsnJrnl·$J



The table mentioned below covers all the file rename activity conducted by the suspect between 2015-03-23 and 2015-03-24. It mentiones about the change in name of the .docx, .pptx, .xlsx, .jpg, .png file along with the old name as well as new name.

Name	Extension	Sequence Number	UpdateSequenceNumber	UpdateTimestamp	UpdateReasons
Sample Table (Annual Report Timeless design).docx	.docx	2	56190648	3/23/2015	RenameOldName

TM02835272[[fn=Sample Table (Annual Report Timeless design)]].docx	.docx	2	56190808	3/23/2015	RenameNewName
Cover Page (Annual Report Red and Black design).docx	.docx	2	56191272	3/23/2015	RenameOldName
TM02835264[[fn=Cover Page (Annual Report Red and Black design)]].docx	.docx	2	56191440	3/23/2015	RenameNewName
Cover Page (Annual Report Timeless design).docx	.docx	1	56193256	3/23/2015	RenameOldName
TM02835265[[fn=Cover Page (Annual Report Timeless design)]].docx	.docx	1	56193416	3/23/2015	RenameNewName
Text Sidebar (Annual Report Red and Black design).docx	.docx	1	56193688	3/23/2015	RenameOldName
TM02835233[[fn=Text Sidebar (Annual Report Red and Black design)]].docx	.docx	1	56193856	3/23/2015	RenameNewName
Sample Table (Annual Report Red and Black design).docx	.docx	1	56194832	3/23/2015	RenameOldName
TM02835271[[fn=Sample Table (Annual Report Red and Black design)]].docx	.docx	1	56195000	3/23/2015	RenameNewName
Cover Letter (Timeless design Resume).docx	.docx	8	56195928	3/23/2015	RenameOldName
TM02836362[[fn=Cover letter (Resume Timeless Design)]].docx	.docx	8	56196072	3/23/2015	RenameNewName
Text Cover (Student Report Blue design).docx	.docx	2	56199504	3/23/2015	RenameOldName
TM02835232[[fn=Text Cover (Student Report Blue design)]].docx	.docx	2	56199656	3/23/2015	RenameNewName
Cover Letter (Chronological resume Simple design).docx	.docx	3	56202816	3/23/2015	RenameOldName
TM02835266[[fn=Cover Letter (Chronological Resume Simple design)]].docx	.docx	3	56202984	3/23/2015	RenameNewName

Cover with Logo (Annual Report Red and Black design).docx	.docx	2	56204008	3/23/2015	RenameOldName
TM02835267[[fn=Cover with Logo (Annual Report Red and Black design)]].docx	.docx	2	56204184	3/23/2015	RenameNewName
Text Cover with TOC (Student Report Blue design).docx	.docx	4	56206328	3/23/2015	RenameOldName
TM02835231[[fn=Text Cover with TOC (Student Report Blue design)]].docx	.docx	4	56206496	3/23/2015	RenameNewName
Photo Sidebar (Annual Report Red and Black design).docx	.docx	2	56210448	3/23/2015	RenameOldName
TM02835270[[fn=Photo Sidebar (Annual Report Red and Black design)]].docx	.docx	2	56210624	3/23/2015	RenameNewName
Photo Cover with TOC (Student Report Blue design).docx	.docx	3	56212696	3/23/2015	RenameOldName
TM02835269[[fn=Photo Cover with TOC (Student Report blue design)]].docx	.docx	3	56212864	3/23/2015	RenameNewName
Photo Cover (Student Report Blue design).docx	.docx	2	56214952	3/23/2015	RenameOldName
TM02835268[[fn=Photo Cover (Student Report Blue design)]].docx	.docx	2	56215104	3/23/2015	RenameNewName
[secret_project]_detailed_proposal.docx	.docx	4	56306184	3/23/2015	RenameOldName
landscape.png	.png	4	56306328	3/23/2015	RenameNewName
[secret_project]_design_concept.ppt	.ppt	7	56307712	3/23/2015	RenameOldName
space_and_earth.mp4	.mp4	7	56307848	3/23/2015	RenameNewName
googledrivesync.exe	.exe	1	56434408	3/23/2015	RenameNewName
icloudsetup.exe	.exe	2	56437312	3/23/2015	RenameNewName

(secret_project)_pricing_decision.xlsx	.xlsx	7	58506640	3/23/2015	RenameOldName
happy_holiday.jpg	.jpg	7	58506776	3/23/2015	RenameNewName
[secret_project]_final_meeting.pptx	.pptx	5	58510288	3/23/2015	RenameOldName
do_u_wanna_build_a_snow_man.mp3	.mp3	5	58510424	3/23/2015	RenameNewName
~WRD0001.docx	.docx	6	59583528	3/23/2015	RenameNewName
~WRD0003.docx	.docx	7	59584688	3/23/2015	RenameNewName
[secret_project]_detailed_design.pptx	.pptx	18	59801680	3/24/2015	RenameOldName
winter_whether_advisory.zip	.zip	18	59801816	3/24/2015	RenameNewName
[secret_project]_revised_points.ppt	.ppt	6	59802408	3/24/2015	RenameOldName
[secret_project]_design_concept.ppt	.ppt	13	59803456	3/24/2015	RenameOldName
space_and_earth.mp4	.mp4	13	59803592	3/24/2015	RenameNewName
[secret_project]_proposal.docx	.docx	6	59804952	3/24/2015	RenameOldName
[secret_project]_proposal.docx	.docx	6	59805072	3/24/2015	RenameNewName
space_and_earth.mp4	.mp4	13	59805312	3/24/2015	RenameOldName
space_and_earth.mp4	.mp4	13	59805416	3/24/2015	RenameNewName
winter_whether_advisory.zip	.zip	18	59805984	3/24/2015	RenameOldName
winter_whether_advisory.zip	.zip	18	59806104	3/24/2015	RenameNewName
[secret_project]_detailed_proposal.docx	.docx	38	59806560	3/24/2015	RenameOldName
[secret_project]_detailed_proposal.docx	.docx	38	59806704	3/24/2015	RenameNewName
[secret_project]_final_meeting.pptx	.pptx	4	59814352	3/24/2015	RenameOldName
do_u_wanna_build_a_snow_man.mp3	.mp3	4	59814488	3/24/2015	RenameNewName
(secret_project)_market_analysis.xlsx	.xlsx	7	59814904	3/24/2015	RenameOldName
new_years_day.jpg	.jpg	7	59815040	3/24/2015	RenameNewName

(secret_project)_market_shares.xls	.xls	9	59815232	3/24/2015	RenameOldName
(secret_project)_price_analysis_#1.xlsx	.xlsx	8	59815536	3/24/2015	RenameOldName
my_favorite_movies.7z	.7z	8	59815680	3/24/2015	RenameNewName
(secret_project)_price_analysis_#2.xls	.xls	10	59815968	3/24/2015	RenameOldName
(secret_project)_pricing_decision.xlsx	.xlsx	14	59816312	3/24/2015	RenameOldName
happy_holiday.jpg	.jpg	14	59816448	3/24/2015	RenameNewName
[secret_project]_progress_#1.docx	.docx	4	59816880	3/24/2015	RenameOldName
my_smartphone.png	.png	4	59817008	3/24/2015	RenameNewName
[secret_project]_progress_#2.docx	.docx	6	59817984	3/24/2015	RenameOldName
[secret_project]_progress_#3.doc	.doc	3	59818320	3/24/2015	RenameOldName
[secret_project]_detailed_proposal.docx	.docx	38	59818624	3/24/2015	RenameOldName
a_gift_from_you.gif	.gif	38	59818768	3/24/2015	RenameNewName
[secret_project]_proposal.docx	.docx	6	59818976	3/24/2015	RenameOldName
landscape.png	.png	6	59819096	3/24/2015	RenameNewName
[secret_project]_technical_review_#1.docx	.docx	7	59819272	3/24/2015	RenameOldName
[secret_project]_technical_review_#1.pptx	.pptx	6	59819592	3/24/2015	RenameOldName
[secret_project]_technical_review_#2.docx	.docx	3	59819912	3/24/2015	RenameOldName
[secret_project]_technical_review_#2.ppt	.ppt	4	59823280	3/24/2015	RenameOldName
[secret_project]_technical_review_#3.doc	.doc	3	59823600	3/24/2015	RenameOldName
[secret_project]_technical_review_#3.ppt	.ppt	6	59823920	3/24/2015	RenameOldName
Resignation_Letter_(Iaman_Informant).docx	.docx	4	64188592	3/24/2015	RenameOldName
Resignation_Letter_(Iaman_Informant).docx	.docx	7	64203528	3/24/2015	RenameOldName
Resignation_Letter_(Iaman_Informant).docx	.docx	9	64212992	3/24/2015	RenameOldName

Resignation_Letter_(Iaman_Informant).docx	.docx	8	64223992	3/24/2015	RenameOldName
Chrysanthemum.jpg	.jpg	285	64404640	3/24/2015	RenameOldName
$RKXD1U3.jpg	.jpg	285	64404736	3/24/2015	RenameNewName
Desert.jpg	.jpg	10	64405352	3/24/2015	RenameOldName
$RI3FM2A.jpg	.jpg	10	64405504	3/24/2015	RenameNewName
Hydrangeas.jpg	.jpg	10	64406824	3/24/2015	RenameOldName
$R508CBB.jpg	.jpg	10	64406912	3/24/2015	RenameNewName
IE11-Windows6.1-x64-en-us.exe	.exe	7	64407528	3/24/2015	RenameOldName
$RJEMT64.exe	.exe	7	64407648	3/24/2015	RenameNewName
Jellyfish.jpg	.jpg	8	64408264	3/24/2015	RenameOldName
$R8YP3XK.jpg	.jpg	8	64408352	3/24/2015	RenameNewName
Koala.jpg	.jpg	10	64408968	3/24/2015	RenameOldName
$RU3FKWI.jpg	.jpg	10	64409048	3/24/2015	RenameNewName
Lighthouse.jpg	.jpg	16	64409688	3/24/2015	RenameOldName
$RX538VH.jpg	.jpg	16	64409776	3/24/2015	RenameNewName
Penguins.jpg	.jpg	12	64410392	3/24/2015	RenameOldName
$RFVCH5V.jpg	.jpg	12	64410480	3/24/2015	RenameNewName
Tulips.jpg	.jpg	10	64411096	3/24/2015	RenameOldName
$RDOI3HE.jpg	.jpg	10	64411176	3/24/2015	RenameNewName

Some of the entries in this table may be duplicated entries or from the recycled values.

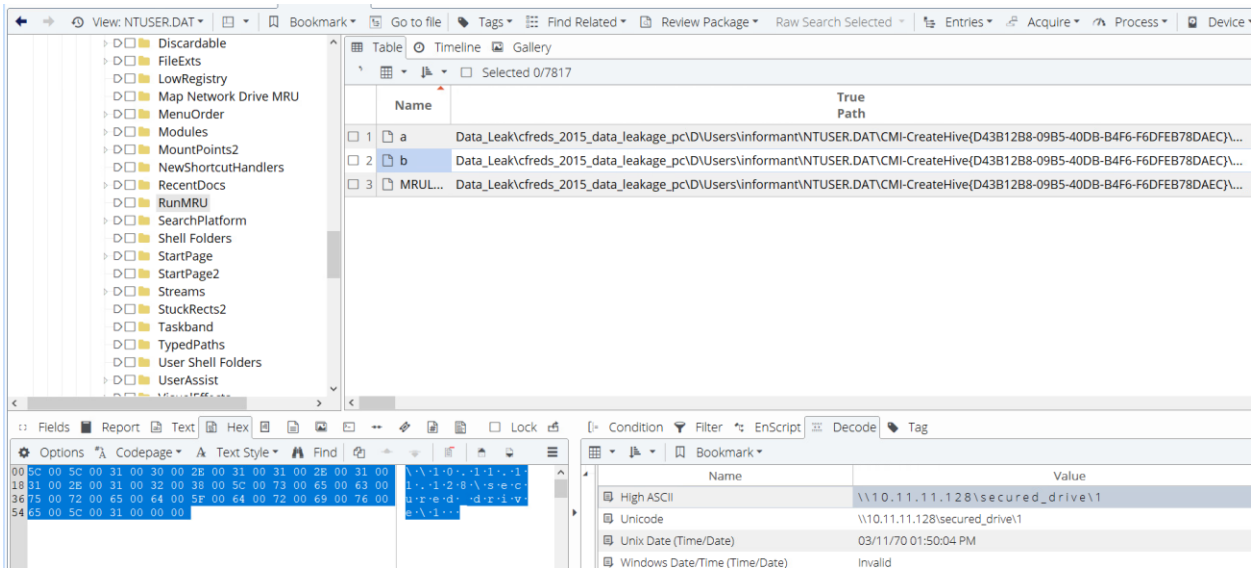
24. What is the IP address of company's shared network drive?

Answer: The name of the shared user drive is "**10.11.11.128\secured_drive**"

Path: Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\NTUSER.DAT\CMI-CreateHive{D43B12B8-09B5-40DB-B4F6-F6DFEB78DAEC}\Software\Microsoft\Windows\CurrentVersion\Explorer\RunMRU\b

- This file path points to a registry key that stores information about recently used Run commands for a the user on a Windows system.

Evidence:

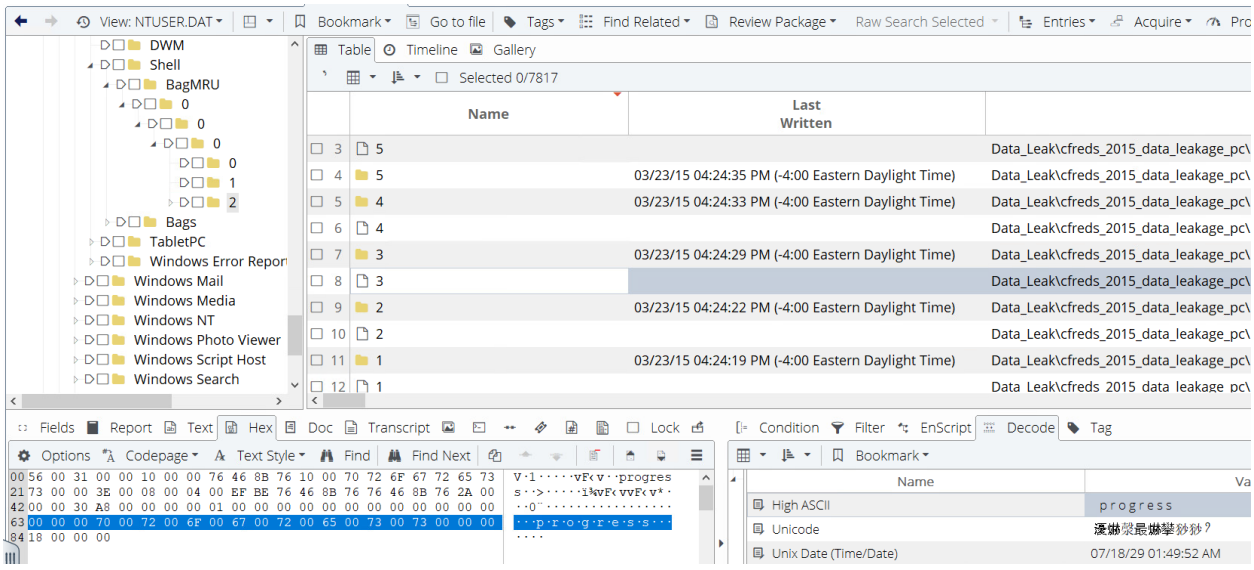


25. List all directories that were traversed in ‘RM#2’.

Answer:

Timestamp	Directory Path
2015-03-24 10:00:19	E:\Secret Project Data\
2015-03-24 10:01:11	E:\Secret Project Data\technical review\
2015-03-24 10:01:14	E:\Secret Project Data\proposal\
2015-03-24 10:01:15	E:\Secret Project Data\progress\
2015-03-24 10:01:17	E:\Secret Project Data\pricing decision\
2015-03-24 10:01:29	E:\Secret Project Data\design\
2015-03-24 16:54:07	E:\Secret Project Data\
2015-03-24 16:54:07	E:\Secret Project Data\progress\

- **Path**: Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\NTUSER.DAT\CMI-CreateHive{D43B12B8-09B5-40DB-B4F6-F6DFEB78DAEC}\Software\Microsoft\Windows\Shell\BagMRU\0



This file path points to a registry key that stores **ShellBags** information for a specific user on a Windows system. These are registry entries that record information about user interactions with folders and files in Windows Explorer. They store details like folder paths, view settings, and timestamps while **0** represents a specific ShellBag entry within the BagMRU key.

26. List all files that were opened in 'RM#2’.

Answer:

27. List all directories that were traversed in the company's network drive.

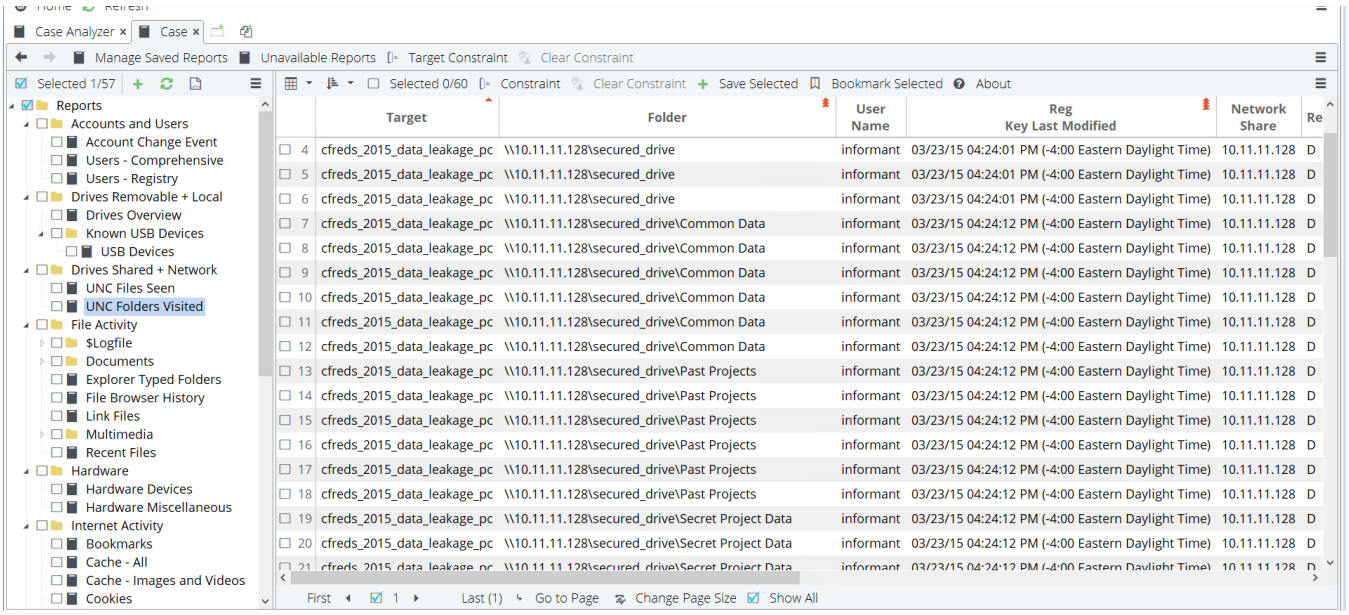
Answer: The were 3 parent directories that were traversed in the company's network drive. They were:

I. **Secret Project Data** (03/23/15 04:28:17 PM (-4:00 Eastern Daylight Time))
II. **Common Data** (03/23/15 04:24:07 PM (-4:00 Eastern Daylight Time))
III. **Past Projects** (03/23/15 04:24:09 PM (-4:00 Eastern Daylight Time))

Path: Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\NTUSER.DAT\CMI-CreateHive{D43B12B8-09B5-40DB-B4F6-F6DFEB78DAEC}\Software\Microsoft\Windows\Shell\BagMRU\0\0\0

- This file path points to a registry key that stores **ShellBags** information for user on a Windows system. **ShellBags:** These are registry entries that record information about user interactions with folders and files in Windows Explorer. They store details like folder paths, view settings, and timestamps.
- **0\0\0** represents a specific ShellBag entry within the BagMRU key. Each number likely corresponds to a level in the folder hierarchy. BagMRU is a registry key that stores **ShellBags**, which are records of user interactions with folders in Windows Explorer

Timestamp	Directory Path
2015-03-23 16:24:01	\\10.11.11.128\secured_drive\Common Data\
2015-03-23 16:24:08	\\10.11.11.128\secured_drive\Past Projects\
2015-03-23 16:24:12	\\10.11.11.128\secured_drive\Secret Project Data\design\
2015-03-23 16:24:15	\\10.11.11.128\secured_drive\Secret Project Data\pricing decision\
2015-03-23 16:24:16	\\10.11.11.128\secured_drive\Secret Project Data\final\
2015-03-23 16:24:18	\\10.11.11.128\secured_drive\Secret Project Data\technical review\
2015-03-23 16:24:20	\\10.11.11.128\secured_drive\Secret Project Data\proposal\
2015-03-23 16:24:27	\\10.11.11.128\secured_drive\Secret Project Data\progress\
2015-03-23 16:26:53	\\10.11.11.128\secured_drive\Secret Project Data\pricing decision\
2015-03-23 16:26:54	\\10.11.11.128\secured_drive\Secret Project Data\pricing decision\
2015-03-23 16:27:24	V:\Secret Project Data\
2015-03-23 16:27:29	V:\Secret Project Data\final\
2015-03-23 16:27:33	V:\Secret Project Data\final\
2015-03-23 16:27:33	V:\Secret Project Data\final\
2015-03-23 16:28:17	\\10.11.11.128\secured_drive\Secret Project Data\
2015-03-23 16:28:17	\\10.11.11.128\secured_drive\Secret Project Data\pricing decision\
2015-03-24 09:47:54	\\10.11.11.128\secured_drive\
2015-03-24 09:47:54	\\10.11.11.128\secured_drive\Past Projects\



28. List all files that were opened in the company's network drive.

Answer: The files accessed were (secret_project)_pricing_decision.xlsx and \[secret_project]_final_meeting.pptx. Here, V: is mapped on \\10.11.11.128. It means that the drive letter V: acts as a shortcut to the shared folder on the computer with the IP address **10.11.11.128.**

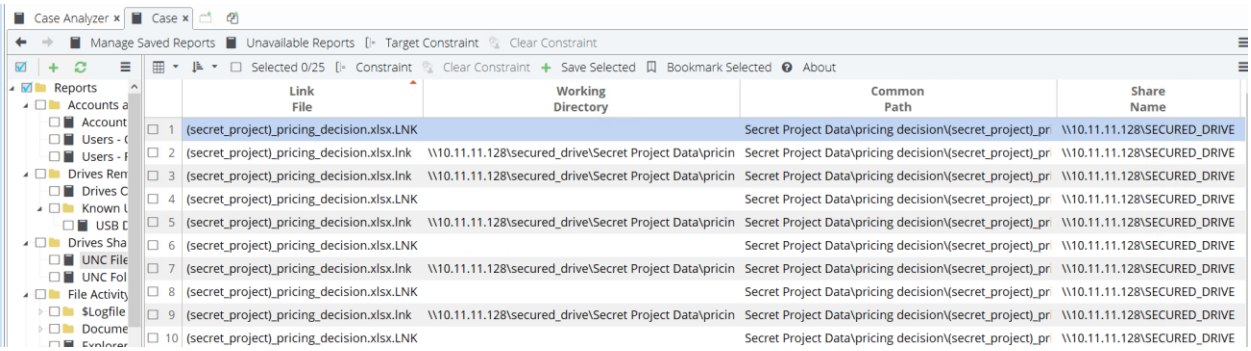
Path: Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\NTUSER.DAT\CMI-CreateHive{D43B12B8-09B5-40DB-B4F6-F6DFEB78DAEC}\Software\Microsoft\Office\15.0\Excel\File MRU\Item 1

Timestamp	Directory Path
2015-03-23 16:26:53	\\10.11.11.128\SECURED_DRIVE\Secret Project Data\ pricing decision\(secret_project)_pricing_decision.xlsx
2015-03-23 16:26:53	\\10.11.11.128\SECURED_DRIVE\Secret Project Data\ pricing decision\(secret_project)_pricing_decision.xlsx
2015-03-23 16:26:53	\\10.11.11.128\SECURED_DRIVE\Secret Project Data\ pricing decision\(secret_project)_pricing_decision.xlsx
2015-03-23 16:26:56	\\10.11.11.128\secured_drive\Secret Project Data\ pricing decision\(secret_project)_pricing_decision.xlsx
2015-03-23 16:27:33	V:\Secret Project Data\final\[secret_project]_final_meeting.pptx
2015-03-23 16:27:33	V:\Secret Project Data\final\[secret_project]_final_meeting.pptx

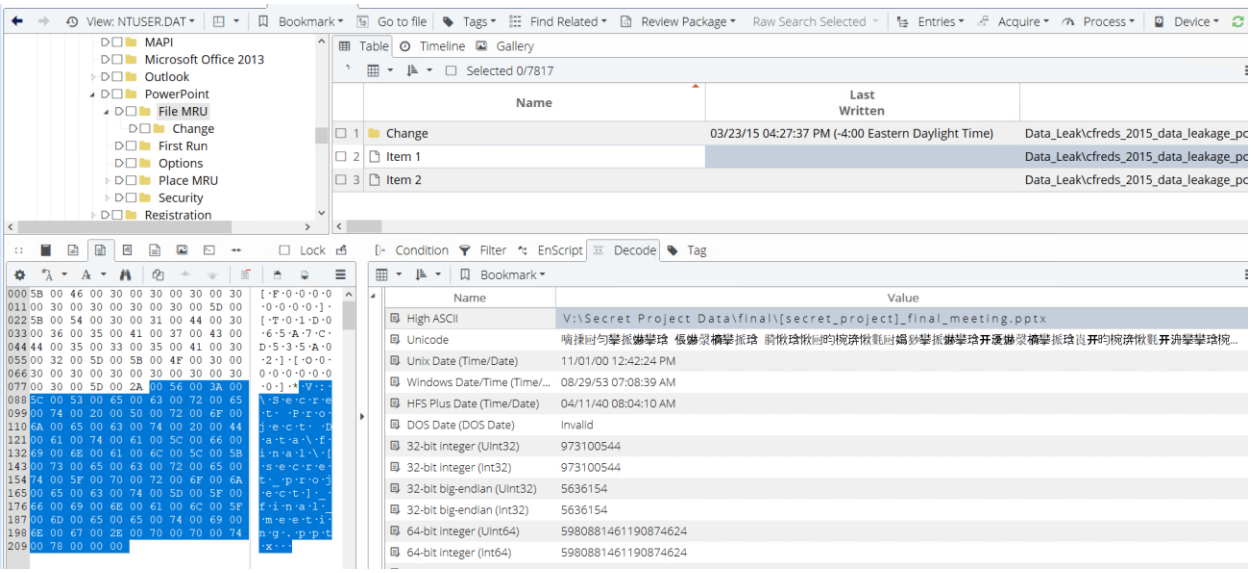
2015-03-23 16:27:37	V:\Secret Project Data\final\[secret_project]_final_meeting.pptx
2015-03-23 16:27:37	V:\Secret Project Data\final\[secret_project]_final_meeting.pptx

Evidence:

- **Excel file**



- **PowerPoint file:**
  Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\NTUSER.DAT\CMI-CreateHive{D43B12B8-09B5-40DB-B4F6-F6DFEB78DAEC}\Software\Microsoft\Office\15.0\PowerPoint\File MRU\Item 1

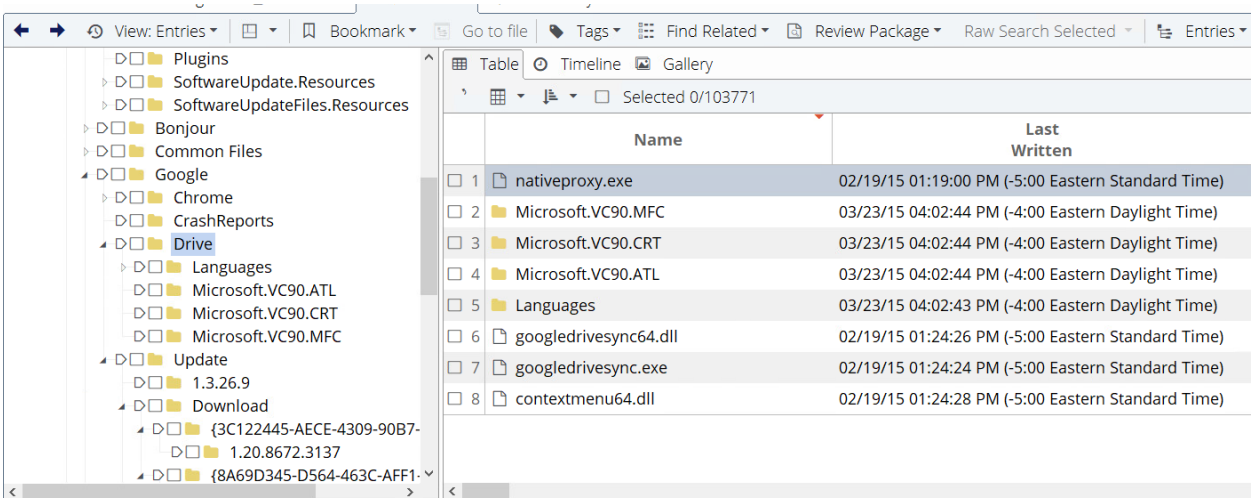


29. Find traces related to cloud services on PC.
(Service name, log files…)

Answer: There are instances were traces of 2 different cloud services were found. The name of cloud services are **Google Drive and Apple iCloud.**

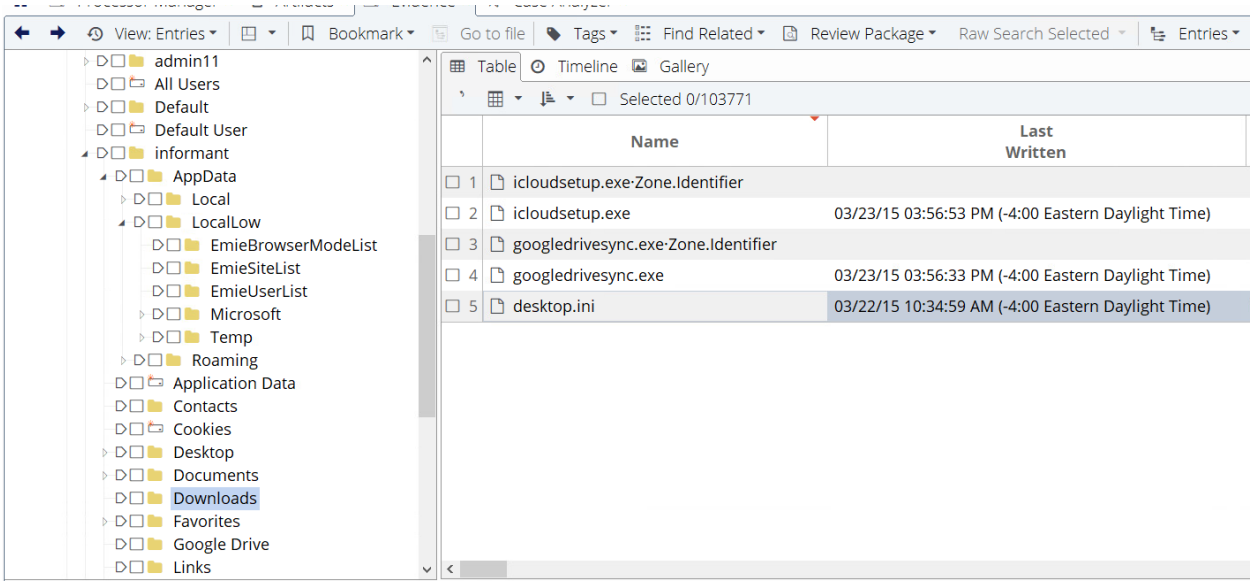
Path related to google drive: Data_Leak\cfreds_2015_data_leakage_pc\D\Program Files (x86)\Google\Drive\

Evidence:



Path related to Apple iCloud:
Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\Downloads\icloudsetup.exe

Evidence:



30. What files were deleted from Google Drive?
    Find the filename and modified timestamp of the file.
    [Hint: Find a transaction log file of Google Drive.]

Answer: There are 2 deleted files are **"do_u_wanna_build_a_snow_man.mp3"** and **"happy_holiday.jpg."**

Path:
Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\AppData\Local\Google\Drive\user_default\sync_log.log

- ➔ **2015-03-23 16:42:17**,026 -0400 INFO pid=2576 4004:LocalWatcher common.change_buffer:1017 Adding event to change buffer: RawEvent(**DELETE**, path=u'\\\\?\\C:\\Users\\informant\\Google Drive**do_u_wanna_build_a_snow_man.mp3'**, time=1427143336.964, ino=1125899906846942L, parent_ino=844424930207017L, affects_gdoc=False, is_cancelled=<RawEventIsCancelledFlag.FALSE: 0>, backup=<Backup.NO_BACKUP_CONTENT: (False, False)>)

- ➔ **2015-03-23 16:42:17**,026 -0400 INFO pid=2576 4004:LocalWatcher common.aggregator:114 --------> Received event RawEvent(**DELETE**, path=u'\\\\?\\C:\\Users\\informant\\Google Drive**happy_holiday.jpg'**, time=1427143336.964, ino=4503599627374809L, parent_ino=844424930207017L, affects_gdoc=False, is_cancelled=<RawEventIsCancelledFlag.FALSE: 0>, backup=<Backup.NO_BACKUP_CONTENT: (False, False)>) None

1624	03-23 16:42:19	369 -0400 WARNING pid=2576 3568:Worker-0	logging:1602 Path \\?\C:\Users\informant\Google Drive\do_u_wanna_build_a_snow_man.mp3 that was supposed to be operated on r
1625	03-23 16:42:19	369 -0400 INFO pid=2576 3568:Worker-0	common.proxy_manager:352 Removing stale proxy entry from cache
1626	03-23 16:42:19	385 -0400 INFO pid=2576 2820:Worker-1	common.workers:188 Worker starting on [ImmutableChange(Direction.UPLOAD
1627	03-23 16:42:19	385 -0400 WARNING pid=2576 2820:Worker-1	logging:1602 Path \\?\C:\Users\informant\Google Drive\happy_holiday.jpg that was supposed to be operated on no longer exist

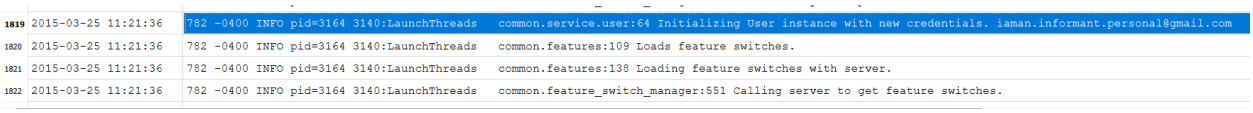
31. Identify account information for synchronizing Google Drive.

Answer: The account used here is **iaman.informant.personal@gmail.com.** And it logged on at **2015-03-23 16:05:32.**

Path:
Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\AppData\Local\Google\Drive\user_default\sync_log.log

Log: 2015-03-23 16:05:32,279 -0400 INFO pid=2576 2828:LaunchThreads common.service.user:64 Initializing User instance with new credentials.

iaman.informant.personal@gmail.com 2015-03-23 16:05:32,279 -0400 INFO pid=2576 2828:LaunchThreads common.sync_app:1153 Feature Switches: FeatureSwitchSettings(accept_blob_download_gzip_encoding=True, auto_backup=False, backup_polling_interval_secs=7200, cloud_graph_disk_generation=2, crash_log_size_limit=10000000, crash_throttle_percentage=99.7, disabled_cloud_graph_disk_app_versions=['1.8.4288.4175', '1.8.4340.2022', '1.10.4711.1662', '1.10.4657.9104', '1.10.4658.6881'], docs_list_page_size=1000, download_in_place=False, download_progress_bar=False, download_strategy='url_template', download_url='https://googledrive.com/p/host/{doc_id}', enable_batch_upload=True, enable_context_menu=True, enable_dapper_trace=False, enable_disk_dict=False,



1819	2015-03-25 11:21:36	782 -0400 INFO pid=3164 3140:LaunchThreads	common.service.user:64 Initializing User instance with new credentials. iaman.informant.personal@gmail.com
1820	2015-03-25 11:21:36	782 -0400 INFO pid=3164 3140:LaunchThreads	common.features:109 Loads feature switches.
1821	2015-03-25 11:21:36	782 -0400 INFO pid=3164 3140:LaunchThreads	common.features:138 Loading feature switches with server.
1822	2015-03-25 11:21:36	782 -0400 INFO pid=3164 3140:LaunchThreads	common.feature_switch_manager:551 Calling server to get feature switches.

32. What a method (or software) was used for burning CD-R?

Answer: The method used for burning the CD-R was likely **Windows' default CD/DVD burning feature (Burning Type 2: Mastered)**.

Path: cfreds_2015_data_leakage_pc\D\Windows\System32\winevt\Logs\System.evtx

Justification:

1. **Event ID 133:** The screenshot shows multiple instances of Event ID 133 in the System event log, indicating a **Type-2 burn**. This event, associated with the "IMAPI CD-Burning COM Service," is logged when Windows' built-in burning service is used. If a third-party application had been used, it likely would have generated its own events or modified the behavior of the IMAPI service, resulting in different event IDs or details.

2. **Burning Type 2 (Mastered):** Microsoft distinguishes between two types of CD/DVD burning:

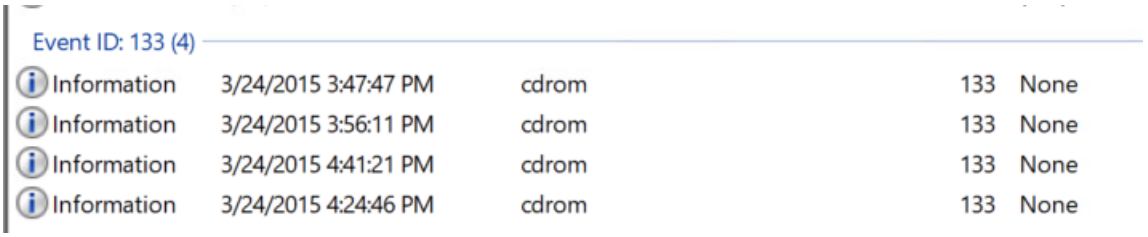
    - **Type 1 (Like a USB flash drive):** This allows you to add and remove files from the disc like a USB drive. This method typically doesn't involve the IMAPI service and wouldn't generate Event ID 133.

    - **Type 2 (Mastered):** This creates a finalized, read-only disc compatible with standard CD/DVD players. This method utilizes the IMAPI service and generates Event ID 133, as seen in the screenshot.

3. **cdrom Source:** The "cdrom" source in the event log entries further indicates that these events are related to the CD/DVD drive and the built-in burning functionality.

4. **Timestamp Correlation:** The timestamps of the Event ID 133 entries might correlate with the "last modified" timestamps of the files on the CD-R, further supporting the conclusion that these events are associated with the burning process.

Based on the presence **of Event ID 133** in the System event log, the absence of any third-party software events, and the correlation with the "Mastered" burning type described in the Microsoft documentation, it is highly likely that the CD-R was burned using Windows' default CD/DVD burning feature.



- The screenshot is from the **system.evtx** file, which is the Windows System event log. This log file records events related to system components, services, and drivers. The **system.evtx** file was first extracted from the forensic image and then opened using the Windows Event Viewer for analysis. The **system.evtx** file is crucial in digital forensics as it provides valuable information about system activities, errors, and events that can help investigators understand the timeline and context of events on a computer. In this case, it helps determine the method used for burning the CD-R.

33. When did the suspect burn CD-R?
    [Hint: It may be one or more times.]

Answer: As per the data from the “system.evtx” log file, there were 4 instances where the suspect burns the CD-R.

Path: cfreds_2015_data_leakage_pc\D\Windows\System32\winevt\Logs\System.evtx

Timestamp	Source	Event ID	Description
3/24/2015 3:47:47 PM	System.evtx log	133	Burning Type 2: cdrom
3/24/2015 3:56:11 PM	System.evtx log	133	Burning Type 2: cdrom
3/24/2015 4:41:21 PM	System.evtx log	133	Burning Type 2: cdrom
3/24/2015 4:24:46 PM	System.evtx log	133	Burning Type 2: cdrom

34. What files were copied from PC to CD-R?
    [Hint: Just use PC image only. You can examine transaction logs of the file system for this task.]

Answer: Root Entry:
Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\AppData\Roaming\Microsoft\Windows\Recent\AutomaticDestinations\1b4dd67f29cb1962.automaticDestinations-ms\Root Entry

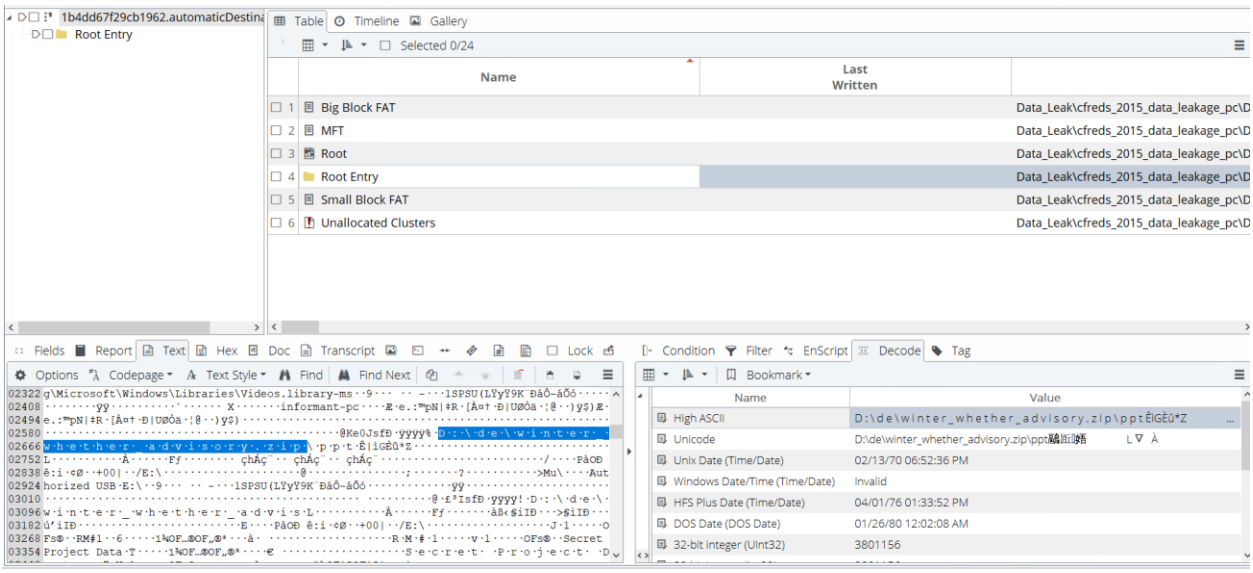
35. What files were opened from CD-R?

Answer: The files accessed from the CD-R are listed below.

Timestamp	File Path
2015-03-24 16:44:13	D:\de\winter_whether_advisory.zip\
2015-03-24 16:44:14	D:\de\winter_whether_advisory.zip\ppt\
2015-03-24 16:44:16	D:\de\winter_whether_advisory.zip\ppt\slides\
2015-03-24 16:44:18	D:\de\winter_whether_advisory.zip\ppt\slideMasters\
2015-03-24 16:44:18	D:\de\winter_whether_advisory.zip
2015-03-24 17:01:10	D:\Penguins.jpg
2015-03-24 17:01:12	D:\Koala.jpg
2015-03-24 17:01:14	D:\Tulips.jpg

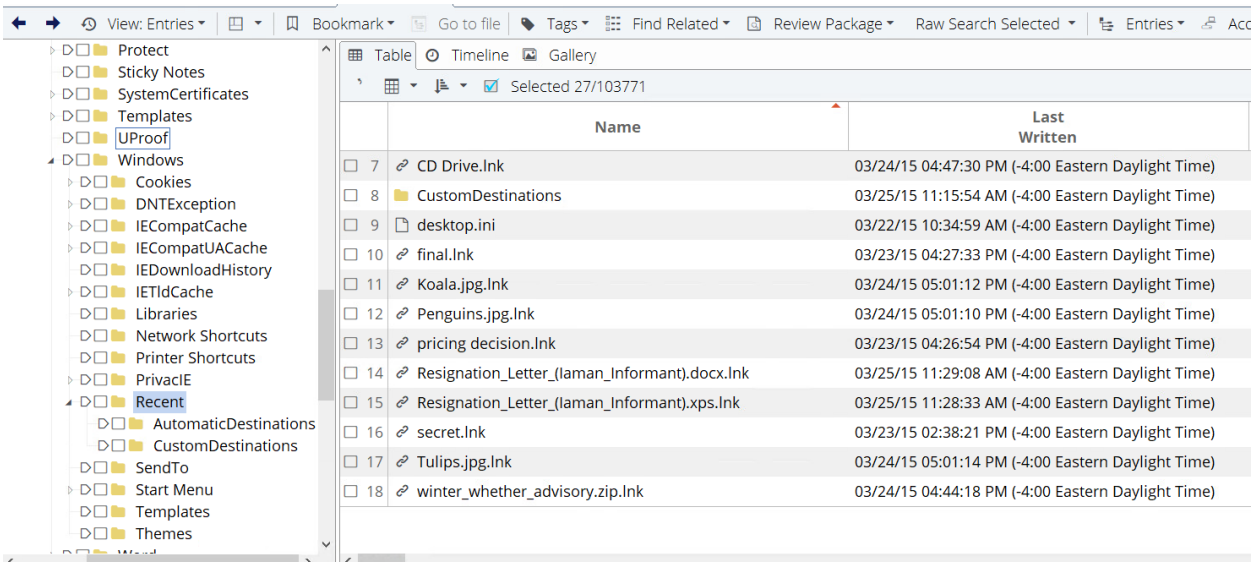
Path: Root Entry:
Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\AppData\Roaming\Microsoft\Windows\Recent\AutomaticDestinations\1b4dd67f29cb1962.automaticDestinations-ms\Root Entry**.**

This file path points to a root storage location within the Jump List file for the recently accessed files and application used by the user "informant" on a Windows system. A **Jump List** file is a feature in Windows 7 that keeps track of recently opened items and tasks associated with a specific application. It's like a personalized history for each app, allowing you to quickly access files or resume tasks you were working on. Jump Lists provide quick access to recently or frequently used items within an application, saving you time from searching for them manually.



Some file access evidence can be found from the root entry logs while some of the recently accessed files are available in the RECENT folder, this is the directory where Windows stores **Jump List** files for different applications and stores is in .lnk format.

Path: Root Entry: Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\AppData\Roaming\Microsoft\Windows\Recent



36. Identify all timestamps related to a resignation file in Windows Desktop.
[Hint: the resignation file is a DOCX file in NTFS file system.]
Answer: This data can be obtained from the $MFT table of the NTFS file system.

Filename: Resignation_Letter_(Iaman_Informant).docx
Parent Path: .\Users\informant\Desktop

Timestamp	Standard Information	Source
3/24/2015 2:48:41 PM EST	File Created	$MFT Table
3/24/2015 2:59:31 PM EST	File Modified	$MFT Table
3/24/2015 2:59:31 PM EST	Last Record Change	$MFT Table
3/24/2015 2:59:31 PM EST	Entry Modified	$MFT Table

The $MFT (Master File Table) is a critical component of the NTFS file system used in Windows. It's essentially a database that stores information about every file and directory on an NTFS volume. Think of it as a central catalog or index for all the files on your hard drive. It stores the following data**:**

- **File Records:** Each file and directory on the NTFS volume has a corresponding entry in the $MFT called a "file record."
- **File Attributes:** These file records contain various attributes that describe the file, including:
    - **$FILE_NAME:** The file's name and extension.
    - **$STANDARD_INFORMATION**: File size, creation time, modification time, access time, and file attributes (e.g., read-only, hidden). Denoted by 0x10
    - **$DATA**: The actual data content of the file (for small files) or pointers to where the data is stored on the disk (for larger files).
    - **$SECURITY_DESCRIPTOR**: Security permissions for the file (who can access it and what they can do).
    - Other attributes related to data encryption, compression, object IDs, etc.

37. How and when did the suspect print a resignation file?

Answer: Upon analysis of the $MFT table entries, there are 5 instances of the user accessing the Resignation_Letter_(Iaman_Informant) file. Each instance having different file extensions like .docx, .xps and .ink.

How the Suspect Printed the Resignation File: The suspect printed the resignation file by utilizing the "Microsoft XPS Document Writer," a virtual printer that outputs documents in

XPS format. This method creates an electronic file that retains the document's formatting and layout, like a PDF.

When the Suspect Printed the Resignation File: The suspect printed the resignation file on **March 25, 2015, at 11:28:34 AM** (timezone applied). This timestamp likely reflects the creation time of the XPS file, which serves as an indicator of when the "printing" action occurred.

The printed resignation file, in XPS format, is located at the following path:
Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\Desktop\Resignation_Letter_(Iaman_Informant).docx

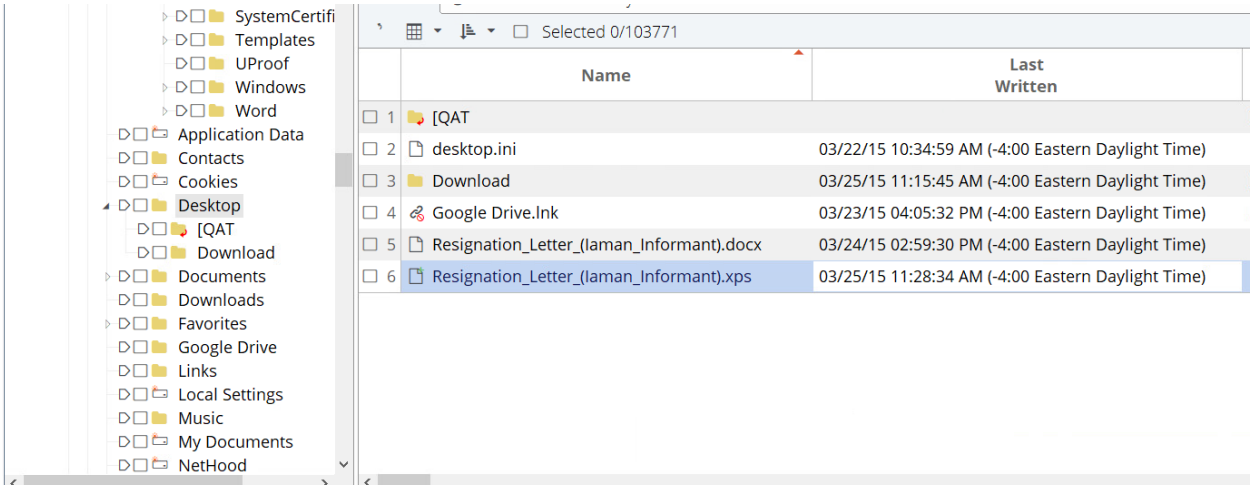
This indicates that the file was "printed" or saved to the user's desktop.

Considerations and Supporting Evidence:

- **No Physical Printers:** The absence of real printer devices on the system suggests that the suspect did not print the resignation letter to a physical printer.
- **XPS File on Desktop:** The presence of an XPS file with a relevant filename on the user's desktop further supports the conclusion that the "Microsoft XPS Document Writer" was used.
- **Registry Keys:** The registry keys under **Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config\SOFTWARE\CMI-CreateHive{199DAFC2-6F16-4946-BF90-5A3FC3A60902}\Microsoft\Windows NT\CurrentVersion\Print\Printers** list the available printers on the system, including "Fax" and "Microsoft XPS Document Writer." This confirms there was no physical printer connected.

Based on the available evidence, it can be concluded that the suspect "printed" the resignation file to an XPS document on their desktop using the "Microsoft XPS Document Writer" on March 25, 2015, at 11:28:34 AM. This method allows for electronic storage and sharing of the document while preserving its formatting and layout.

Type	Description
How	Converted to XPS format
When	03/25/15 11:28:34 AM (-4:00 Eastern Daylight Time)
Where	\D\Users\informant\Desktop\Resignation_Letter_(Iaman_Informant).xps

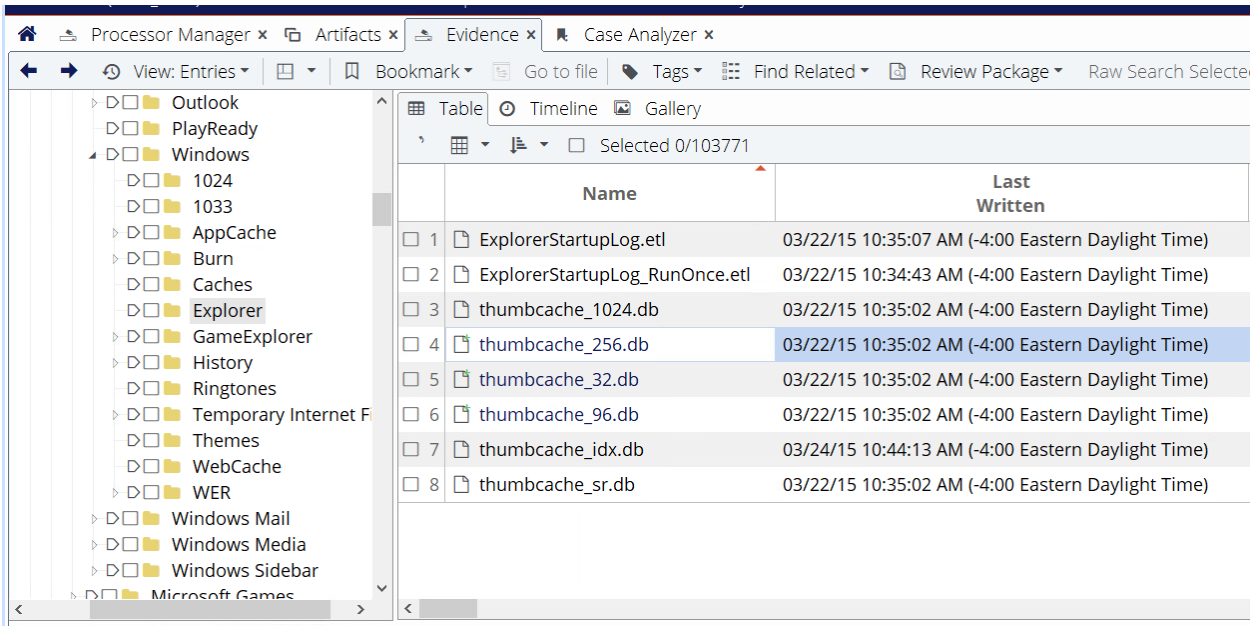


38. Where are 'Thumbcache' files located?

Answer: The thumbcache files are located at "Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\AppData\Local\Microsoft\Windows\Explorer"

Windows thumbnail cache files are used by windows to store thumbnail images of pictures, videos, and documents so that they can be displayed quickly in File Explorer's thumbnail view. Here's a breakdown of the files:

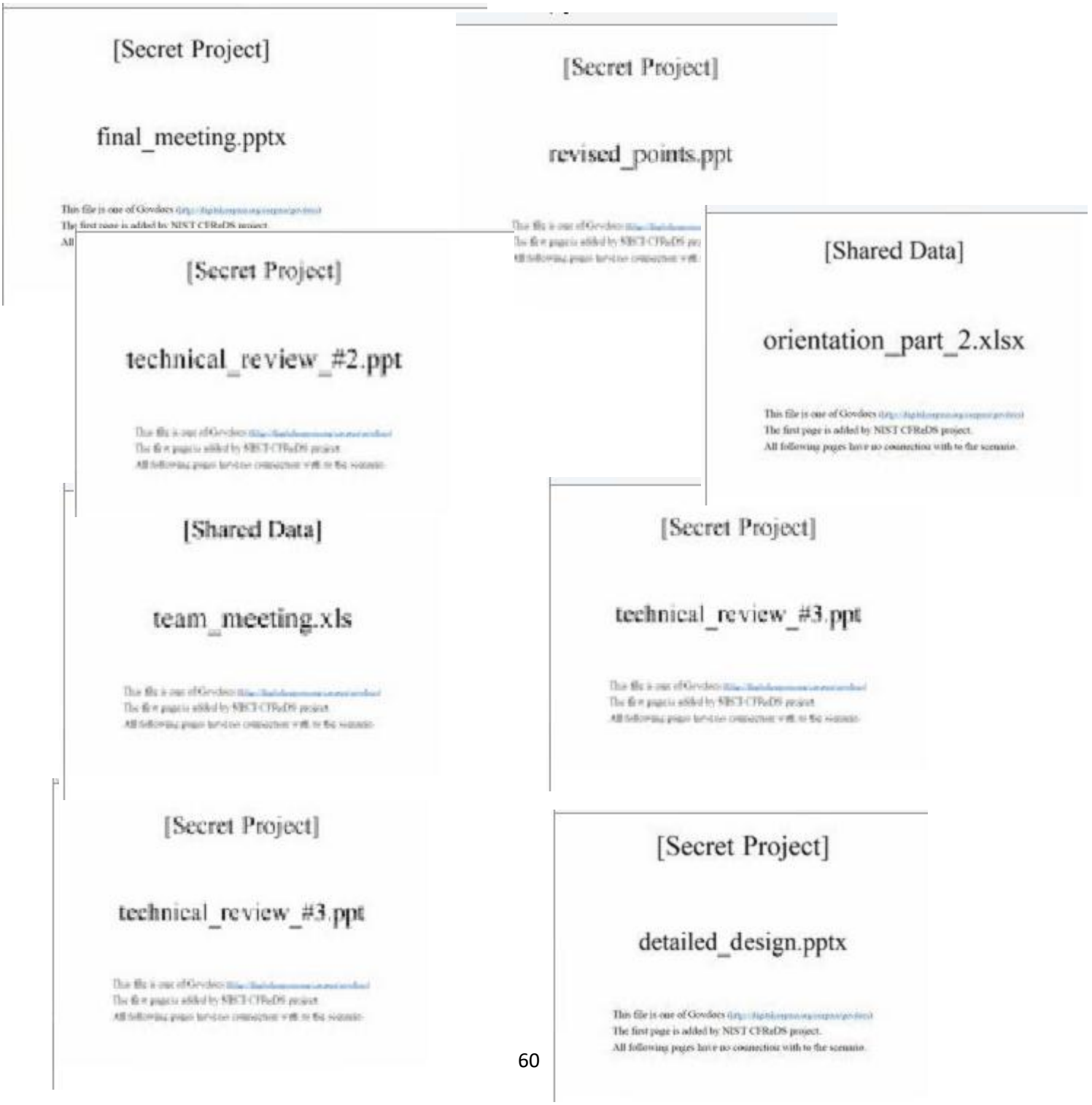
- **thumbcache_xxx.db**: These are the main thumbnail cache databases. The xxx represents the size of the thumbnails stored in that specific file (32, 96, 256, 1024 pixels).
- **thumbcache_idx.db**: This file acts as an index for the thumbnail cache, helping Windows quickly locate specific thumbnails.
- **thumbcache_sr.db**: This file stores information about the image resolution and other properties.



39. Identify traces related to confidential files stored in Thumbcache.
    (Include '256' only)

Answer: There are traces of several confidential files like .pptx and xlsx found under the thumbcache directory. This items are found under the thumbcache_256.db directory and this are the cache images of the first page of PowerPoint files.

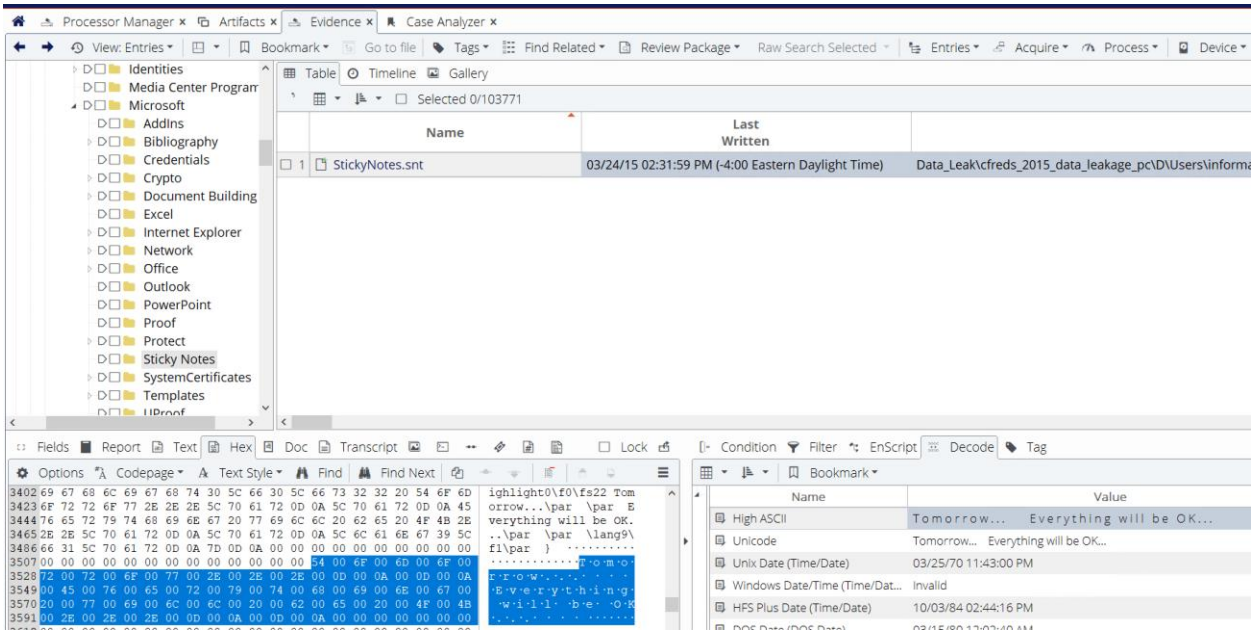
Path:
Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\AppData\Local\Microsoft\Windows\Explorer\thumbcache_256.db



40. Where are Sticky Note files located?

Answer: The stick notes file is located at “Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\AppData\Roaming\Microsoft\Sticky Notes\StickyNotes.snt”

- A **StickyNotes.snt** file is the data file used by the **Sticky Notes** application in Windows. It stores the contents of all sticky notes, including the text, formatting (font, color, size), and position on the desktop.



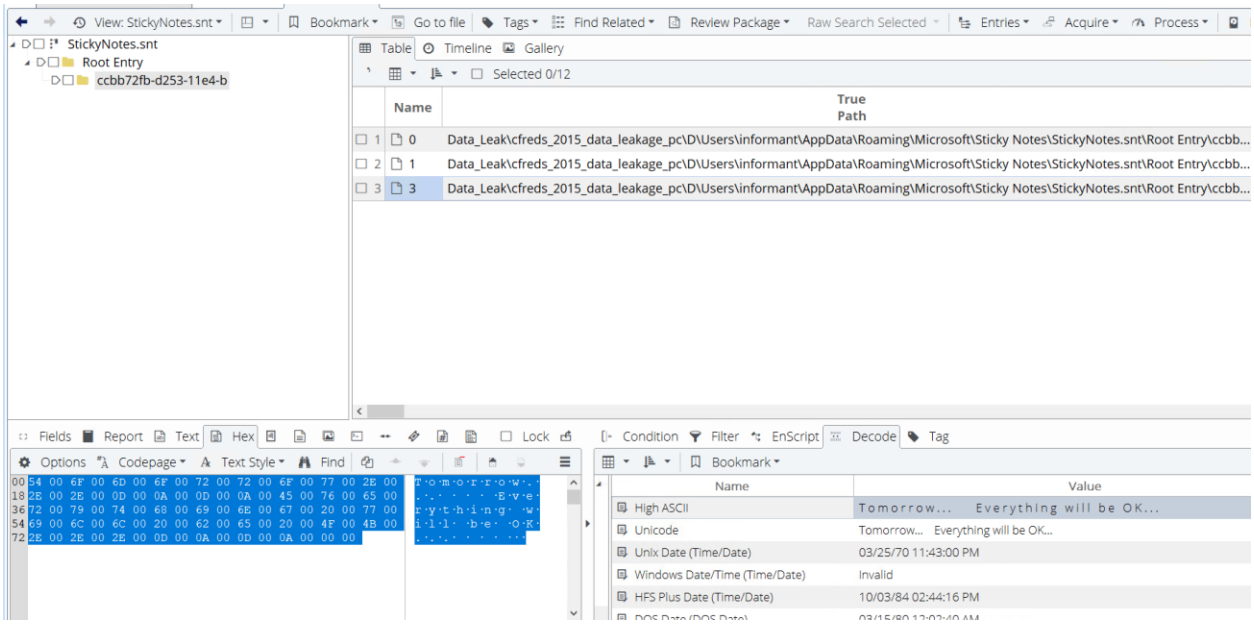
41. Identify notes stored in the Sticky Note file.

Answer: There is a note stored in the sticky notes that reads “T o m o r r o w . . . E v e r y t h i n g w i l l b e O K . . . “

Path:
Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\AppData\Roaming\Microsoft\Sticky Notes\StickyNotes.snt\Root Entry\ccbb72fb-d253-11e4-b\3

Evidence:

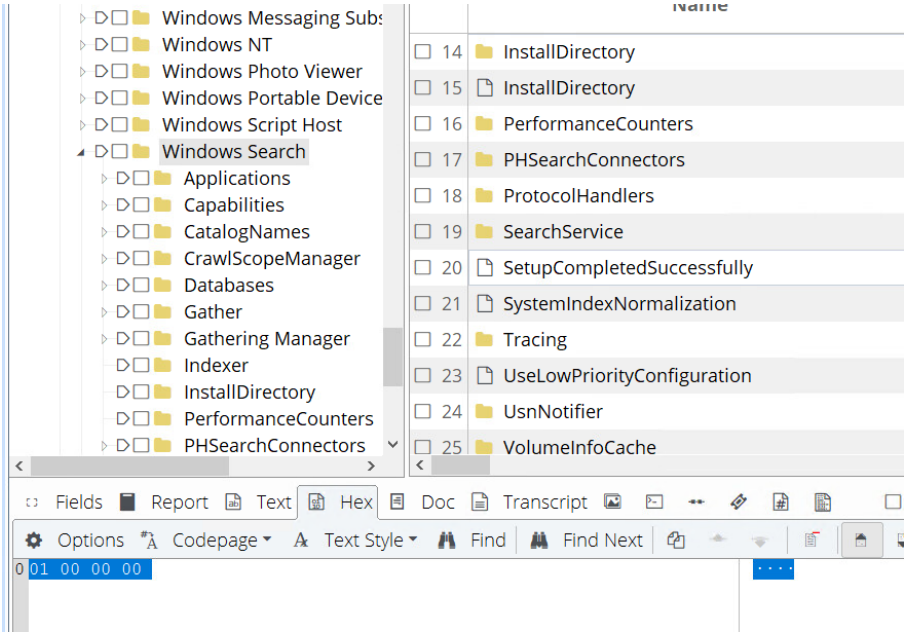
```
 Root Entry ccbb72fb-d253-11e4-b
ÿƒö ccbb72fb-d253-11e4-b {\rtf1\ansi\ansicpg1252\deff0\deflang1033{\fonttbl{\f0\fnil\fcha0
 rset0 Segoe Print;}{\f1\fnil Segoe Print;}}
 {\*\generator Msftedit
5.41.21.2510;}\viewkind4\uc1\pard\tx360\tx720\tx1080\tx1440\tx1800\tx2160\tx2520\tx2880\tx3240\tx3600\tx3960\t
x4320\tx4680\tx5040\tx5400\tx5760\tx6120\tx6480\tx6840\tx7200\tx7560\tx7920\tx8280\tx8640\tx9000\tx9360\tx9720
\tx10080\tx10440\tx10800\tx11160\tx11520\highlight0\f0\fs22 Tomorrow...\par
 Everything will be OK...\par
 \lang9\f1\par
 Tomorrow...
 Everything will be OK...
```

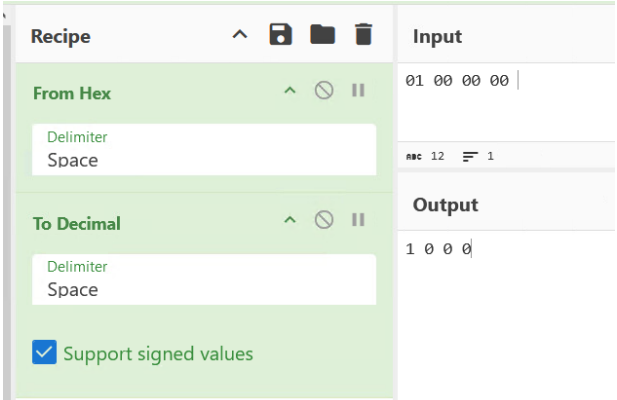


42. Was the 'Windows Search and Indexing' function enabled? How can you identify it? If it was enabled, what is a file path of the 'Windows Search' index database?

Answer: Yes, the windows search and indexing function is enabled on this system. It can be verified from the ***software*** registry hive by looking at the "*SetupCompletedSuccessfully"* key.

- The *"SetupCompletedSuccessfully:"* Indicates if the initial setup of Windows Search was completed. If set to 1, it suggests the service is configured to run.
- **Path:** Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config\SOFTWARE\CMI-CreateHive{199DAFC2-6F16-4946-BF90-5A3FC3A60902}\Microsoft\Windows Search\SetupCompletedSuccessfully
- **Evidence:** The hex value 01 00 00 00 when converted to dec, represents 1 that indicates that search and index is turned ON

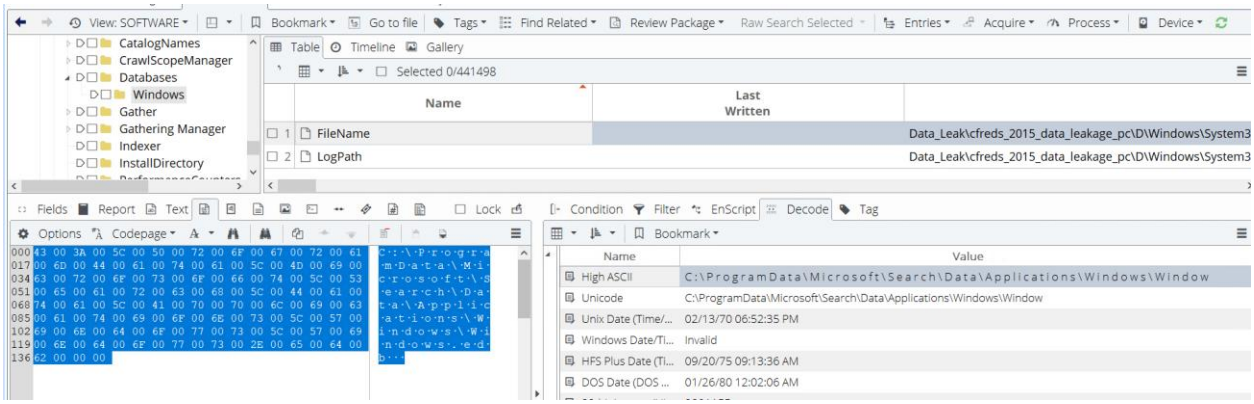




43. What kinds of data were stored in Windows Search database?

Answer: This evidence can be inferred from the value of the key “FILENAME” under the database directory. The SOFTWARE hive that likely stores information related to the Windows Search database and **FileName** key contain the name and path of the Windows.edb file, which is the actual database file where Windows Search stores its index of files and content. The general file path for the search index database is: “C:\ProgramData\Microsoft\Search\Data\Applications\Windows\Windows.edb”

Path:
Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config\SOFTWARE\CMI-CreateHive{199DAFC2-6F16-4946-BF90-5A3FC3A60902}\Microsoft\Windows Search\Databases\Windows\FileName



44. Find traces of Internet Explorer usage stored in Windows Search database.
(It should be considered only during a date range between 2015-03-22 and 2015-03-23.)

Answer: The table given below, extracted from the Windows Search database (Windows.edb), reveals traces of Internet Explorer usage by the suspect between March 22nd and 23rd, 2015. The table shows the System_DateModified and Microsoft_IE_TargetUrl columns, indicating the time of modification and the specific URLs accessed using Internet Explorer.

Timestamp	Internet Explorer Data
22-03-2015 11:09	http://windows.microsoft.com/en-us/internet-explorer/ie-8-welcome
22-03-2015 11:09	http://www.msn.com/?ocid=iehp
22-03-2015 11:09	https://www.google.com/?gws_rd=ssl
22-03-2015 11:09	https://www.google.com/search?hl=en&source=hp&q=internet+explorer+11&gbv=2&oq=internet+explorer+11&gs_l=he hp.3..0l10.5163.7893.0.9562.20.13.0.7.7.0.156.1110.11j2.13.0.msedr...0...1ac.1.34.heirloom-hp..0.20.1250.5j7Xm44tv

22-03-2015 11:09	http://www.google.com/url?url=http://windows.microsoft.com/en-us/internet-explorer/download-ie&rct=j&frm=1&q=&esrc=s&sa=U&ei=6ykQVZWLGbeJsQT7goDACg&ved=0CB8QFjAA&usg=AFQjCNEwsIz17kY-jTXbaV
22-03-2015 11:09	http://windows.microsoft.com/en-us/internet-explorer/download-ie
22-03-2015 11:09	http://www.google.com/url?url=http://windows.microsoft.com/en-us/internet-explorer/ie-11-worldwide-languages&rct=j&frm=1&q=&esrc=s&sa=U&ei=6ykQVZWLGbeJsQT7goDACg&ved=0CCoQFjAB&usg=AFQjCNE7UKIWE
22-03-2015 11:10	http://windows.microsoft.com/en-us/internet-explorer/ie-11-worldwide-languages
22-03-2015 11:10	https://www.google.com/webhp?hl=en
22-03-2015 11:10	https://www.google.com/chrome/index.html?hl=en&brand=CHNG&utm_source=en-hpp&utm_medium=hpp&utm_camp
22-03-2015 11:11	http://download.microsoft.com/download/7/1/7/7179A150-F2D2-4502-9D70-4B59EA148EAA/IE11-Windows6.1-x64-
22-03-2015 11:11	https://www.google.com/chrome/browser/thankyou.html?brand=CHNG&platform=win&clickonceinstalled=1
23-03-2015 13:26	https://odc.officeapps.live.com/odc/emailhrd?lcid=1033&syslcid=1033&uilcid=1033&app=5&ver=15&build=15.0.4420&
23-03-2015 13:27	http://www.microsoft.com/en-us/ie-firstrun/win-7/ie-11/vie
23-03-2015 13:27	http://www.bing.com/search
23-03-2015 13:27	http://go.microsoft.com/fwlink/?LinkId=69157
23-03-2015 13:28	http://www.bing.com/
23-03-2015 14:07	http://www.bing.com/news/search?q=Top Stories&FORM=NSBABR
23-03-2015 14:07	http://www.bing.com/search?q=Top+Stories&FORM=HDRSC1
23-03-2015 14:07	http://www.bing.com/news/search?q=file+sharing+and+tethering&FORM=HDRSC6
23-03-2015 14:08	http://www.bing.com/search?q=file+sharing+and+tethering&qs=n&form=QBLH&pq=file+sharing+and+tethering&sc=0-1&sk=&cvid=171b77e4ffd54b2a92c4e97abf995fe1
23-03-2015 14:08	http://sysinfotools.com/blog/tethering-internet-files-sharing/
23-03-2015 14:11	http://resources.infosecinstitute.com/windows-systems-and-artifacts-in-digital-forensics-part-i-registry/
23-03-2015 14:12	https://technet.microsoft.com/en-us/library/cc162846.aspx
23-03-2015 14:12	https://support.microsoft.com/en-us/kb/308427
23-03-2015 14:12	http://en.wikipedia.org/wiki/Event_Viewer
23-03-2015 14:13	https://msdn.microsoft.com/en-us/library/windows/desktop/dd562212(v=vs.85).aspx
23-03-2015 14:14	http://www.forensicswiki.org/wiki/USB_History_Viewing
23-03-2015 16:43	http://www.bing.com/search?q=external%20device%20and%20forensics&qs=n&form=QBRE&pq=external%20device%9&sp=-1&sk=&cvid=c30c4b1f36114b1c9bc683838c69823a
23-03-2015 16:43	http://www.bing.com/?FORM=Z9FD1
23-03-2015 16:43	http://www.bing.com/news?FORM=Z9LH3
23-03-2015 16:44	http://www.bing.com/news?q=science+technology+news&FORM=NWBTCB
23-03-2015 16:45	http://www.wired.com/?p=1756538

45. List the e-mail communication stored in Windows Search database.
(It should be considered only during a date range between 2015-03-23 and 2015-03-24.)

Answer:

Timestamp	Source	From	To	Subject	Body
23-03-2015 13:29	Inbox	spy.conspirator@nist.gov	iaman.informant@nist.gov	Hello, Iaman	How are you doing?
23-03-2015 14:44	Sent Items	iaman.informant@nist.gov	spy.conspirator@nist.gov	RE: Hello, Iaman	RE: Hello, Iaman
23-03-2015 15:14	Inbox	spy.conspirator@nist.gov	iaman.informant@nist.gov	Good job, buddy.	Good, job. I need a more detailed data about this business.
23-03-2015 15:19	Sent Items	iaman.informant@nist.gov	spy.conspirator@nist.gov	Good job, buddy.	This is a sample. ---------- From: spy Sent: Monday, March 23, 2015 3:15 PM To: iaman Subject: Good job, buddy. Good, job. I need a more detailed data about this business.
23-03-2015 15:20	Inbox	spy.conspirator@nist.gov	iaman.informant@nist.gov	RE: Good job, buddy.	Okay, I got it. I'll be in touch. ---------- **From**: iaman **Sent**: Monday, March 23, 2015 3:19 PM **To**: spy **Subject**: RE: Good job, buddy. This is a sample. ---------- **From**: spy

					Sent: Monday, March 23, 2015 3:15 PM **To**: iaman **Subject**: Good job, buddy. Good, job. I need a more detailed data about this business.
23-03-2015 15:26	Inbox	spy.conspirator@nist.gov	iaman.informant@nist.gov	Important request	I confirmed it. But I need a more data. Do your best.
23-03-2015 15:27	Sent Items	iaman.informant@nist.gov	spy.conspirator@nist.gov	RE: Important request	Umm..... I need time to think. --- **From**: spy **Sent**: Monday, March 23, 2015 3:26 PM **To**: iaman **Subject**: Important request I confirmed it. But, I need a more data. Do your best.
23-03-2015 16:38	Deleted Items	iaman.informant@nist.gov	spy.conspirator@nist.gov	It's me	Use links below, https://drive.google.com/file/d/0Bz0ye6gXtiZaVl8yVU5mWHlGbWc/view?usp=sharing

					https://drive.google.com/file/d/0Bz0ye6gXtiZaakx6d3R3c0JmM1U/view?usp=sharing
23-03-2015 16:41	Deleted Items	spy.conspirator@nist.gov	iaman.informant@nist.gov	RE: It's me	I got it. --- **From**: iaman **Sent**: Monday, March 23, 2015 4:39 PM **To**: spy **Subject**: It's me Use links below, https://drive.google.com/file/d/0Bz0ye6gXtiZaVl8yVU5mWHlGbWc/view?usp=sharing https://drive.google.com/file/d/0Bz0ye6gXtiZaakx6d3R3c0JmM1U/view?usp=sharing
24-03-2015 09:25	Inbox	spy.conspirator@nist.gov	iaman.informant@nist.gov	Last request	This is the last request. I want to get the remaining data.
24-03-2015 09:30	Sent Items	iaman.informant@nist.gov	spy.conspirator@nist.gov	RE: Last request	Stop it! It is very hard to transfer all data over the internet! --- **From:** spy **Sent**: Tuesday, March 24, 2015 9:26 AM **To**: iaman **Subject**: Last request This is the last request.

					I want to get the remaining data.
24-03-2015 09:32	Inbox	spy.conspirator@nist.gov	iaman.informant@nist.gov	Watch out!	USB device may be easily detected. So, try another method.
24-03-2015 09:33	Inbox	spy.conspirator@nist.gov	iaman.informant@nist.gov	RE: Last request	No problem. U can directly deliver storage devices that stored it. --- **From**: iaman **Sent**: Tuesday, March 24, 2015 9:30 AM **To**: spy **Subject**: RE: Last request Stop it! It is very hard to transfer all data over the internet! --- **From**: spy **Sent**: Tuesday, March 24, 2015 9:26 AM **To**: iaman **Subject**: Last request This is the last request. I want to get the remaining data.
24-03-2015 15:34	Deleted Items	iaman.informant@nist.gov	spy.conspirator@nist.gov	RE: Watch out!	I am trying. --- **From**: spy **Sent**: Tuesday, March 24, 2015 3:33 PM
24-03-2015 09:35	Deleted Items	iaman.informant@nist.gov	spy.conspirator@nist.gov	RE: Last request	

					To: iaman **Subject**: Watch out! USB device may be easily detected. So, try another method. --- **From**: iaman **Sent**: Tuesday, March 24, 2015 9:30 AM **To**: spy **Subject**: RE: Last request Stop it! It is very hard to transfer all data over the internet! --- **From**: spy **Sent**: Tuesday, March 24, 2015 9:26 AM **To**: iaman **Subject**: Last request This is the last request. I want to get the remaining data.
24-03-2015 15:34	Deleted Items	iaman.informant@nist.gov	spy.conspirator@nist.gov	RE: Watch out!	I am trying.

					---------- **From**: spy **Sent**: Tuesday, March 24, 2015 3:33 PM **To**: iaman **Subject**: Watch out! USB device may be easily detected. So, try another method.
24-03-2015 17:05	Deleted Items	iaman.informant@nist.gov	spy.conspirator@nist.gov	Done	It's done. See you tomorrow.

The evidence presented in the table is derived from the Windows Search database, specifically the **Windows.edb file**. This file, which utilizes the Microsoft ESE (Extensible Storage Engine) database format, functions as an index of files and content to enable faster searching within Windows. This windows.ebd file is in **Data_Leak\cfreds_2015_data_leakage_pc\D\ProgramData\Microsoft\Search\Data\Applications\Windows\Windows.edb**

This email conversation is tabulated using the data from various columns extracted from this database, including:

- **System_ItemPathDisplay:** This column likely contains the file paths of indexed items, providing information about the location of files within the file system.
- **System_Message_FromName**, **System_Message_ToAddress**, **System_Message_ToName**, **System_Message_DateSent**, **System_Message_DateReceived**, and **System_Message_AttachmentNames**: These columns appear to be related to email data, suggesting that the Windows Search index included email content. These columns likely store information about the sender's name, recipient's email address and name, the dates when the email was sent and received, and the names of any attachments associated with the email.

46. List files and directories related to Windows Desktop stored in Windows Search database.
(Windows Desktop directory: \Users\informant\Desktop\)

Answer:

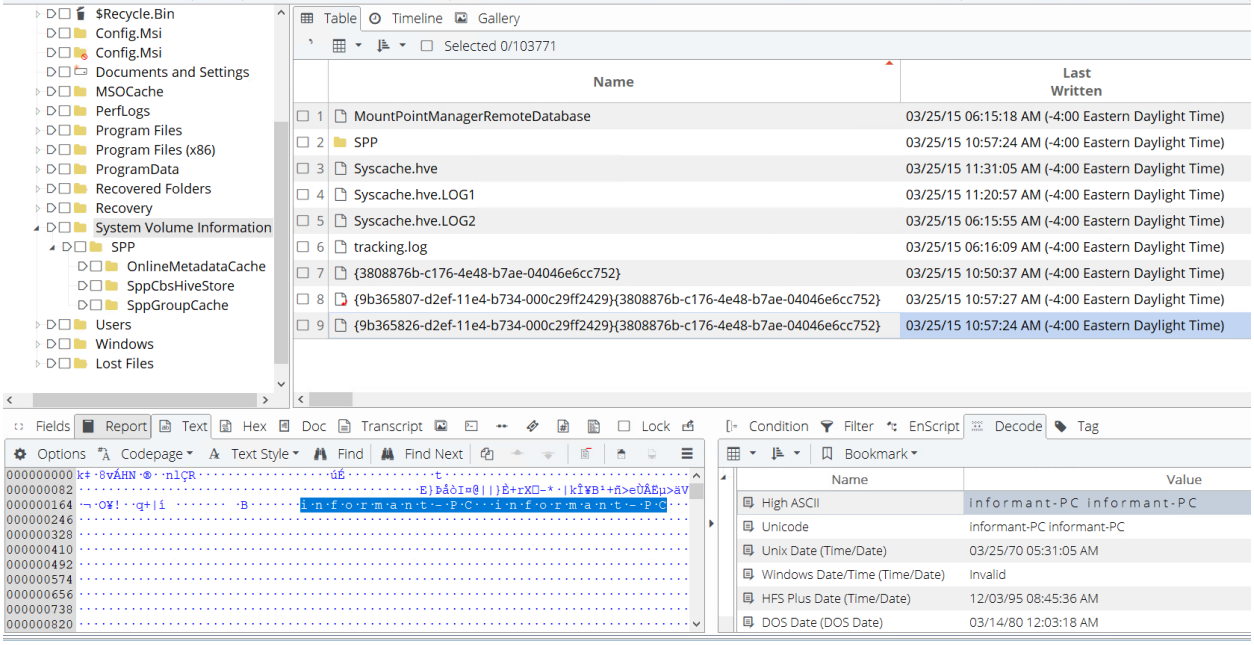
Desktop Files	Creation Timestamps
C:\Users\informant\Desktop\temp\Tulips.jpg	3/24/2015 19:52
C:\Users\informant\Desktop\temp\Penguins.jpg	3/24/2015 19:52
C:\Users\informant\Desktop\temp\Lighthouse.jpg	3/24/2015 19:52
C:\Users\informant\Desktop\temp\Koala.jpg	3/24/2015 19:52
C:\Users\informant\Desktop\temp\Jellyfish.jpg	3/24/2015 19:52
C:\Users\informant\Desktop\temp\IE11-Windows6.1-x64-en-us.exe	3/24/2015 19:52
C:\Users\informant\Desktop\temp\Hydrangeas.jpg	3/24/2015 19:52
C:\Users\informant\Desktop\temp\Desert.jpg	3/24/2015 19:52
C:\Users\informant\Desktop\temp\Chrysanthemum.jpg	3/24/2015 19:52
C:\Users\informant\Desktop\temp	3/24/2015 19:52
C:\Users\informant\Desktop\S data\Secret Project Data\Secret Project Data\proposal\[secret_project]_proposal.docx	3/24/2015 13:40
C:\Users\informant\Desktop\S data\Secret Project Data\Secret Project Data\proposal\[secret_project]_detailed_proposal.docx	3/24/2015 13:40
C:\Users\informant\Desktop\S data\Secret Project Data\Secret Project Data\proposal	3/24/2015 13:47
C:\Users\informant\Desktop\S data\Secret Project Data\Secret Project Data\pricing decision\(secret_project)_price_analysis_#1.xlsx	3/24/2015 13:47
C:\Users\informant\Desktop\S data\Secret Project Data\Secret Project Data\pricing decision\(secret_project)_market_shares.xls	3/24/2015 13:47
C:\Users\informant\Desktop\S data\Secret Project Data\Secret Project Data\pricing decision\(secret_project)_market_analysis.xlsx	3/24/2015 13:47
C:\Users\informant\Desktop\S data\Secret Project Data\Secret Project Data\final\[secret_project]_final_meeting.pptx	3/24/2015 13:47
C:\Users\informant\Desktop\S data\Secret Project Data\Secret Project Data\design\winter_whether_advisory.zip	3/24/2015 13:40
C:\Users\informant\Desktop\S data\Secret Project Data\Secret Project Data\design\winter_storm.amr	3/24/2015 13:40
C:\Users\informant\Desktop\S data\Secret Project Data\Secret Project Data\design\space_and_earth.mp4	3/24/2015 13:40
C:\Users\informant\Desktop\S data\Secret Project Data\Secret Project Data\design\[secret_project]_detailed_design.pptx	3/24/2015 13:47
C:\Users\informant\Desktop\Resignation_Letter_(Iaman_Informant).docx	3/24/2015 18:48
C:\Users\informant\Desktop\Google Drive.lnk	3/23/2015 20:05
C:\Users\informant\Desktop\Download\IE11-Windows6.1-x64-en-us.exe	3/22/2015 15:11
C:\Users\informant\Desktop\Download	3/22/2015 15:08
C:\Users\informant\Desktop\desktop.ini	3/22/2015 14:34

The evidence presented in the table is derived from the Windows Search database, specifically the **Windows.edb** file. This file, which utilizes the Microsoft ESE (Extensible Storage Engine) database format, functions as an index of files and content to enable faster searching within the Windows operating system. The table displays various columns extracted from this database, including System_DateCreated, and System_ItemPathDisplay. These columns likely provide information about file creation and modification timestamps, and file paths respectively.

47. Where are Volume Shadow Copies stored? When were they created?

Answer: **Volume Shadow Copies** are essentially snapshots of your data at a specific point in time. Imagine you're working on a document and accidentally deleting a crucial paragraph. Volume Shadow Copy Service (VSS) shadow copies are typically stored in the hidden System Volume Information folder in the root directory of a drive. However, the shadow copy storage location can be configured to use a different NTFS volume. Generally, folder is located at the root of each volume (e.g., C:\System Volume Information).

- **Path:** Data_Leak\cfreds_2015_data_leakage_pc\D\System Volume Information
- **Creation Time:**
- **Evidence:**

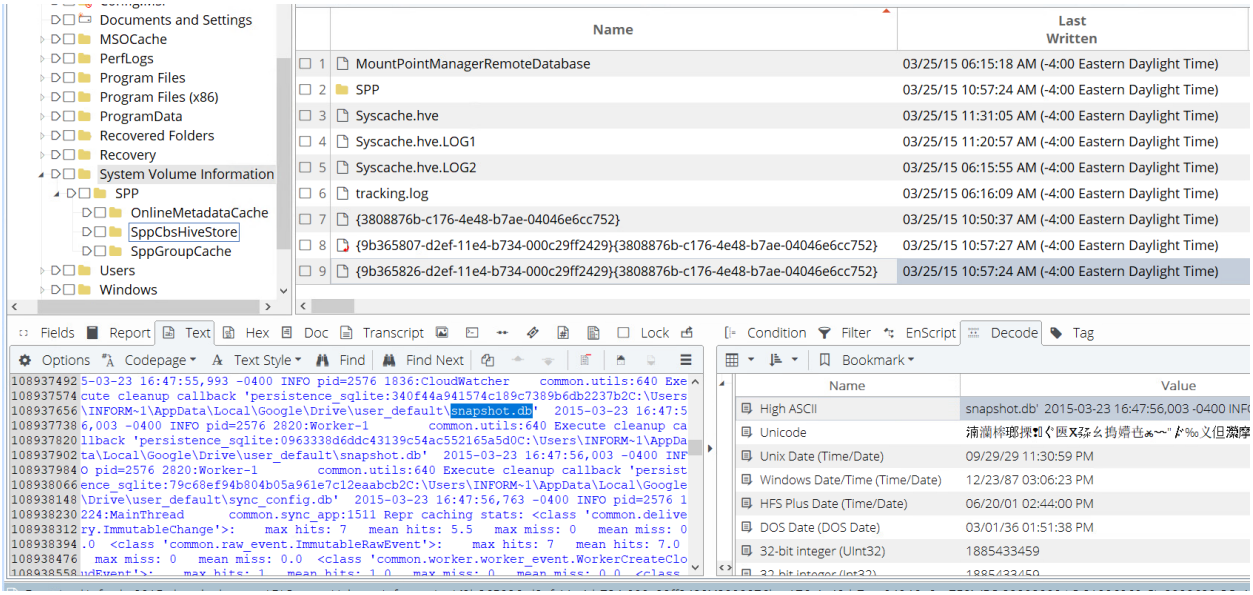


The red "X" icon in the EnCase view indicates that the file has been deleted from the *current* file system, meaning it no longer exists in its original location. However, the file is still present within the Volume Shadow Copy. This means the file was present when the

shadow copy was created but was deleted sometime afterward. The file "{9b365826-d2ef-11e4-b734-000c29ff2429}{3808876b-c176-4e48-b7ae-04046e6cc752}" appears to be a Volume Shadow Copy file. It's name consists of two GUIDs (Globally Unique Identifiers). These GUIDs represent:

- **{9b365826-d2ef-11e4-b734-000c29ff2429}:** A specific Volume Shadow Copy point.
- **{3808876b-c176-4e48-b7ae-04046e6cc752}:** The System Protection storage area

48. Find traces related to Google Drive service in Volume Shadow Copy.
What are the differences between the current system image (of Question 29 ~ 31) and its VSC?



Answer:

The traces related to google drive services.

➔ **2015-03-23 16:47:55,993** -0400 INFO pid=2576 2820:Worker-1 common.persistence.sqlite:379 Close connection. path=C:\Users\INFORM~1\AppData\Local\Google\Drive\user_default**sync_config.db**

➔ **2015-03-23 16:47:55,993** -0400 INFO pid=2576 1836:CloudWatcher common.utils:640 Execute cleanup callback 'persistence_sqlite:340f44a941574c189c7389b6db2237b2C:\Users\INFORM~1\AppData\Local\Google\Drive\user_default**snapshot.db**'

- ➔ **2015-03-23 16:47:56,003** -0400 INFO pid=2576 2820:Worker-1 common.utils:640 Execute cleanup callback 'persistence_sqlite:0963338d6ddc43139c54ac552165a5d0C:\Users\INFORM~1\AppData\Local\Google\Drive\user_default**\snapshot.db'**

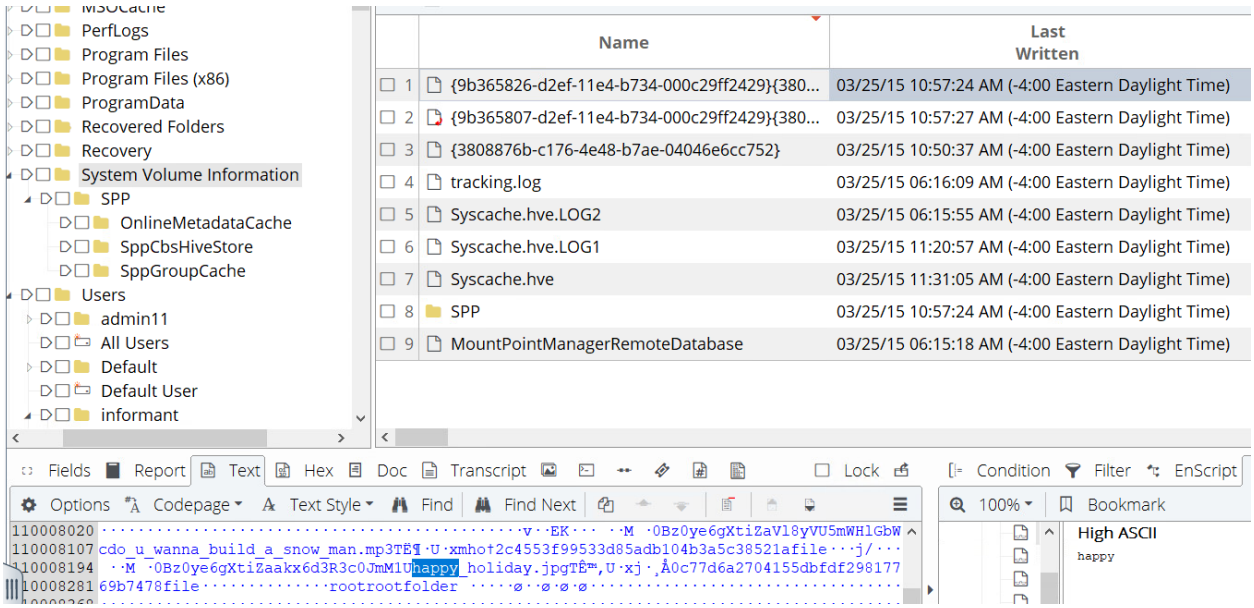
- ➔ **2015-03-23 16:47:56,003** -0400 INFO pid=2576 2820:Worker-1 common.utils:640 Execute cleanup callback 'persistence_sqlite:79c68ef94b804b05a961e7c12eaabcb2C:\Users\INFORM~1\AppData\Local\Google\Drive\user_default**sync_config.db'**

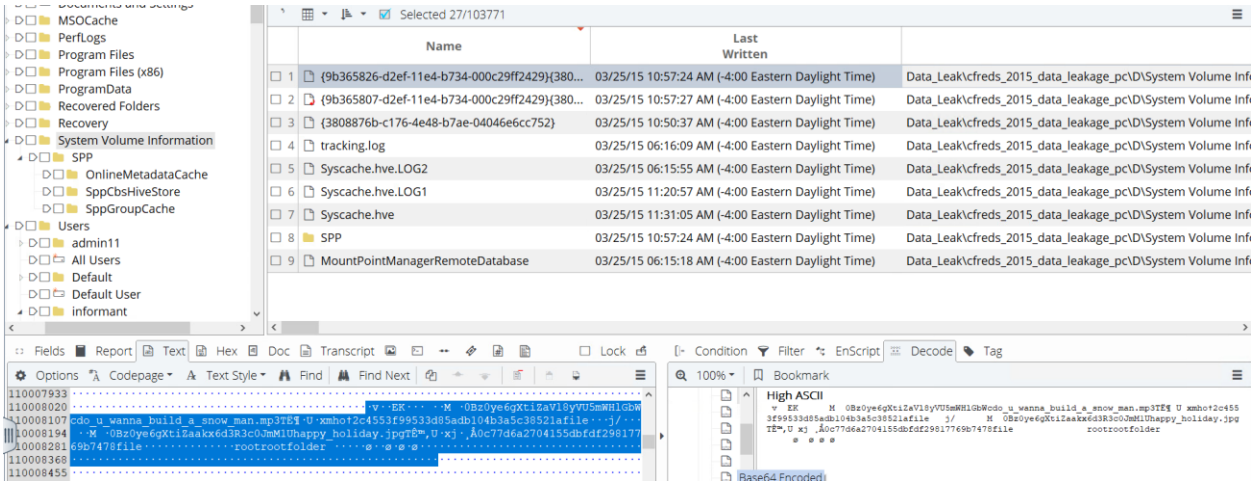
The discrepancies observed between the current system image and the Volume Shadow Copy (VSC) indicate that the VSC represents an earlier state of the system, captured before a logoff activity occurred on March 25, 2015. This is evidenced by the presence of the sync_log.log file and two SQLite files (**snapshot.db** and **sync_config.db**) within the VSC, which are absent in the current system image. The last entry in the sync_log.log file within the VSC is timestamped March 23, 2015, while the VSC itself was created on *March 25, 2015, at 10:57:27 AM*, after the logoff activity that presumably deleted the log file and SQLite databases. This discrepancy confirms that the VSC provides a snapshot of the system's state before the logoff activity and the associated deletion of files.

49. What files were deleted from Google Drive?
    Find deleted records of *cloud_entry* table inside *snapshot.db* from VSC.
    (Just examine the SQLite database only. Let us suppose that a text based log file was wiped.)
    [Hint: DDL of *cloud_entry* table is as follows.]

    CREATE TABLE *cloud_entry*
    (doc_id **TEXT**, filename **TEXT**, modified **INTEGER**, created **INTEGER**,
    acl_role **INTEGER**,
    doc_type **INTEGER**, removed **INTEGER**, size **INTEGER**, checksum **TEXT**,
    shared **INTEGER**,
    resource_type **TEXT**, PRIMARY KEY (doc_id));

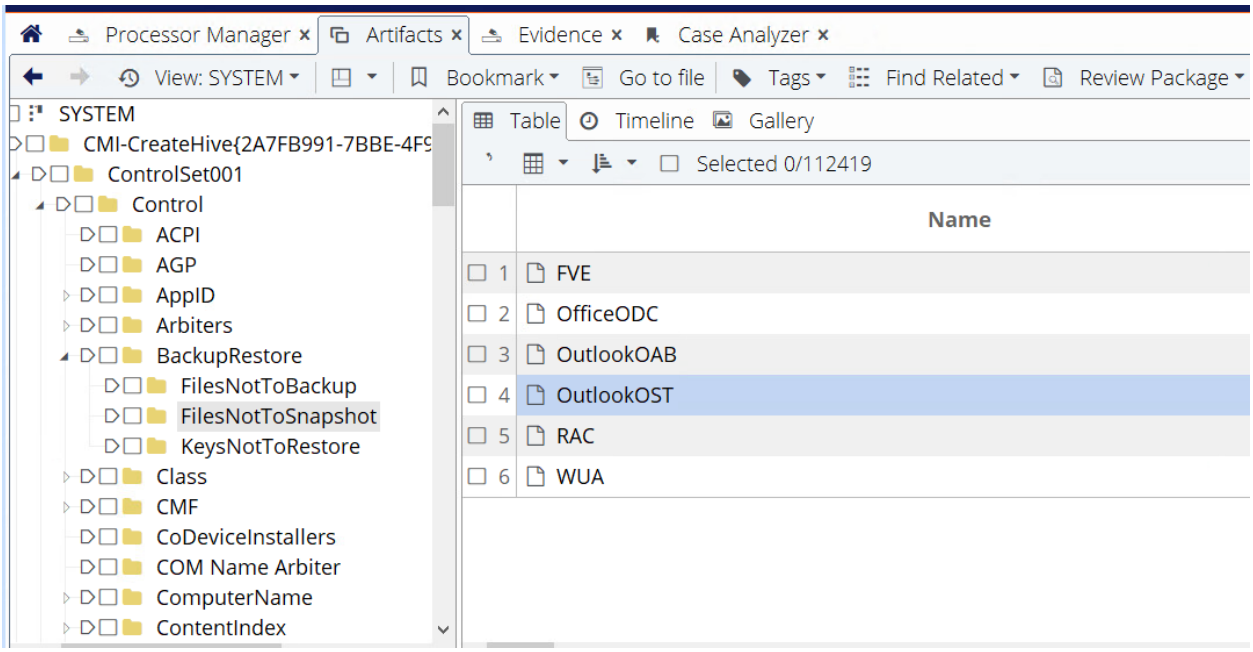
Answer: Forensic analysis of the Volume Shadow Copy (VSC) located at **Data_Leak\cfreds_2015_data_leakage_pc\D\System Volume Information\{9b365826-d2ef-11e4-b734-000c29ff2429}{3808876b-c176-4e48-b7ae-04046e6cc752}** revealed evidence of file deletion. Specifically, two deleted records were identified within the snapshot.db file contained in the VSC. The first deleted record was found at file offset 0x702, while the second was located at file offset 0x77A. These deleted records suggest that the user intentionally or unintentionally removed these files from the system. However, due to the nature of Volume Shadow Copies, these deleted files remain preserved within the VSC, providing valuable forensic evidence for potential recovery or analysis of the user's actions.


PerfLogs
Program Files
Program Files (x86)
ProgramData
Recovered Folders
Recovery
System Volume Information
SPP
OnlineMetadataCache
SppCbsHiveStore
SppGroupCache
Users
admin11
All Users
Default
Default User
informant
Name
Last Written
1 {9b365826-d2ef-11e4-b734-000c29ff2429}{380... 03/25/15 10:57:24 AM (-4:00 Eastern Daylight Time)
2 {9b365807-d2ef-11e4-b734-000c29ff2429}{380... 03/25/15 10:57:27 AM (-4:00 Eastern Daylight Time)
3 {3808876b-c176-4e48-b7ae-04046e6cc752} 03/25/15 10:50:37 AM (-4:00 Eastern Daylight Time)
4 tracking.log 03/25/15 06:16:09 AM (-4:00 Eastern Daylight Time)
5 Syscache.hve.LOG2 03/25/15 06:15:55 AM (-4:00 Eastern Daylight Time)
6 Syscache.hve.LOG1 03/25/15 11:20:57 AM (-4:00 Eastern Daylight Time)
7 Syscache.hve 03/25/15 11:31:05 AM (-4:00 Eastern Daylight Time)
8 SPP 03/25/15 10:57:24 AM (-4:00 Eastern Daylight Time)
9 MountPointManagerRemoteDatabase 03/25/15 06:15:18 AM (-4:00 Eastern Daylight Time)
Fields Report Text Hex Doc Transcript Lock Condition Filter EnScript
Options Codepage Text Style Find Find Next 100% Bookmark
110008020
110008107 cdo_u_wanna_build_a_snow_man.mp3TÉ¶·U·xmho†2c4553f99533d85adb104b3a5c38521afile···j/···
110008194 ··M ·0Bz0ye6gXtiZaakx6d3R3c0JmM1Uhappy_holiday.jpgTÊ™,U·xj·¸Å0c77d6a2704155dbfdf298177
110008281 69b7478file·····rootrootfolder ····ø··ø·ø·ø·
High ASCII
happy


Selected 27/103771
Name
Last Written
1 {9b365826-d2ef-11e4-b734-000c29ff2429}{380... 03/25/15 10:57:24 AM (-4:00 Eastern Daylight Time) Data_Leak\cfreds_2015_data_leakage_pc\D\System Volume Inf
2 {9b365807-d2ef-11e4-b734-000c29ff2429}{380... 03/25/15 10:57:27 AM (-4:00 Eastern Daylight Time) Data_Leak\cfreds_2015_data_leakage_pc\D\System Volume Inf
3 {3808876b-c176-4e48-b7ae-04046e6cc752} 03/25/15 10:50:37 AM (-4:00 Eastern Daylight Time) Data_Leak\cfreds_2015_data_leakage_pc\D\System Volume Inf
4 tracking.log 03/25/15 06:16:09 AM (-4:00 Eastern Daylight Time) Data_Leak\cfreds_2015_data_leakage_pc\D\System Volume Inf
5 Syscache.hve.LOG2 03/25/15 06:15:55 AM (-4:00 Eastern Daylight Time) Data_Leak\cfreds_2015_data_leakage_pc\D\System Volume Inf
6 Syscache.hve.LOG1 03/25/15 11:20:57 AM (-4:00 Eastern Daylight Time) Data_Leak\cfreds_2015_data_leakage_pc\D\System Volume Inf
7 Syscache.hve 03/25/15 11:31:05 AM (-4:00 Eastern Daylight Time) Data_Leak\cfreds_2015_data_leakage_pc\D\System Volume Inf
8 SPP 03/25/15 10:57:24 AM (-4:00 Eastern Daylight Time) Data_Leak\cfreds_2015_data_leakage_pc\D\System Volume Inf
9 MountPointManagerRemoteDatabase 03/25/15 06:15:18 AM (-4:00 Eastern Daylight Time) Data_Leak\cfreds_2015_data_leakage_pc\D\System Volume Inf
Fields Report Text Hex Doc Transcript Lock Condition Filter EnScript Decode Tag
Options Codepage Text Style Find Find Next 100% Bookmark
High ASCII

50. Why can't we find Outlook's e-mail data in Volume Shadow Copy?

Answer: To include OST files in VSS, a specific registry key needs to be modified. If this modification hasn't been done, the OST file won't be included in the shadow copy. To include OST files in the backup, you need to access the registry editor and navigate to the following location: **Data_Leak\cfreds_2015_data_leakage_pc\D\Windows\System32\config\SYSTEM\CMI-CreateHive{2A7FB991-7BBE-4F9D-B91E-7CB51D4737F5}\ControlSet001\Control\BackupRestore\FilesNotToSnapshot\OutlookOST**. Within this SYSTEM hive, you will find a subfolder named "*FilesNotTOSnapshot*" and within this subfolder there is a subkey called "***OutlookOST***". By deleting this key, we can allow VSC to include the Outlook's email data in Volume Shadow Copy.



51. Examine 'Recycle Bin' data in PC.

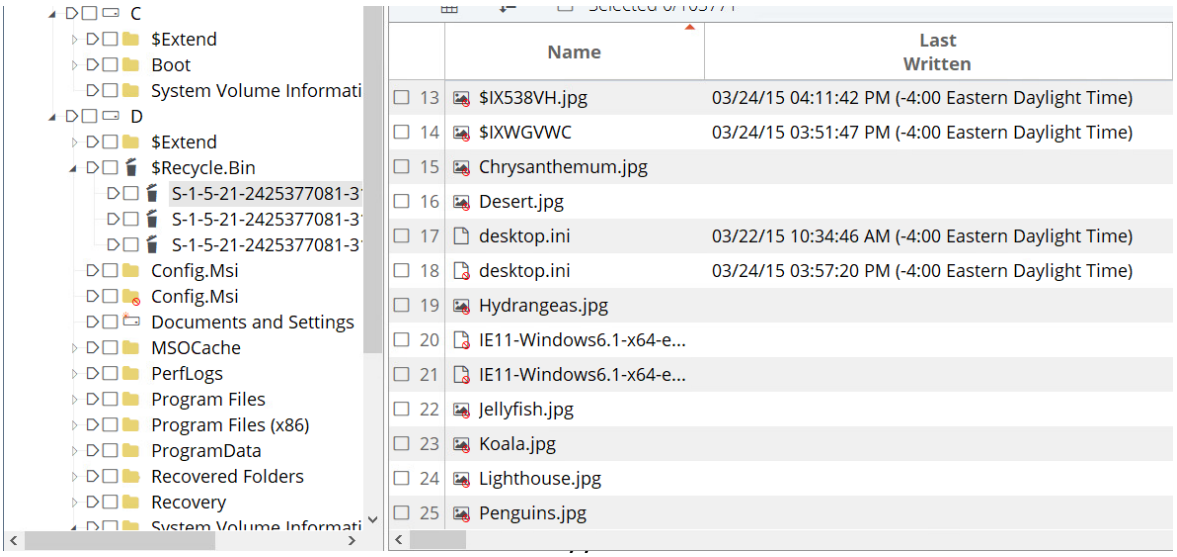
Answer: The PC under investigation, in this case, is a windows 7 computer. Thus, When you delete a file in Windows 7, two files are created in the Recycle Bin:

- **$I[random].extension:** This is the **information file**. It stores metadata about the original file, such as its original location, deletion date, and file size. The **$I** file keeps track of important information about the deleted file, allowing Windows to restore it to its original location if needed.

- **$R[random].extension:** This is the **contents file**. It stores the actual data of the deleted file. If you restore a deleted file, Windows uses the information in the **$I** file to put the data from the **$R** file back where it belongs.

Even if the Recycle Bin has been emptied, these $I and $R files can persist in unallocated space or within a forensic image. The data in the $RecycleBin can be accessed from **Data_Leak\cfreds_2015_data_leakage_pc\D\$Recycle.Bin\S-1-5-21-2425377081-3129163575-2985601102-1000**

Recycled File Name	Deletion Date	Original File Path
$I40295N	2015-03-24 15:51:47	C:\Users\informant\AppData\Local\Microsoft\Windows\Burn\Burn\prop
$IXWGVWC	2015-03-24 15:51:47	C:\Users\informant\AppData\Local\Microsoft\Windows\Burn\Burn\prog
$I55Z163	2015-03-24 15:51:47	C:\Users\informant\AppData\Local\Microsoft\Windows\Burn\Burn\pd
$I9M7UMY	2015-03-24 15:51:47	C:\Users\informant\AppData\Local\Microsoft\Windows\Burn\Burn\tr
$I508CBB.jpg	2015-03-24 16:11:42	C:\Users\informant\AppData\Local\Microsoft\Windows\Burn\Burn\Hydrangeas.jpg
$I8YP3XK.jpg	2015-03-24 16:11:42	C:\Users\informant\AppData\Local\Microsoft\Windows\Burn\Burn\Jellyfish.jpg
$IDOI3HE.jpg	2015-03-24 16:11:42	C:\Users\informant\AppData\Local\Microsoft\Windows\Burn\Burn\Tulips.jpg
$IFVCH5V.jpg	2015-03-24 16:11:42	C:\Users\informant\AppData\Local\Microsoft\Windows\Burn\Burn\Penguins.jpg
$II3FM2A.jpg	2015-03-24 16:11:42	C:\Users\informant\AppData\Local\Microsoft\Windows\Burn\Burn\Desert.jpg
$IIQGWTT.ini	2015-03-24 16:11:42	C:\Users\informant\AppData\Local\Microsoft\Windows\Burn\Burn\desktop.ini
$IJEMT64.exe	2015-03-24 16:11:42	C:\Users\informant\AppData\Local\Microsoft\Windows\Burn\Burn\IE11-Windows6.1-x64-en-us.exe
$IKXD1U3.jpg	2015-03-24 16:11:42	C:\Users\informant\AppData\Local\Microsoft\Windows\Burn\Burn\Chrysanthemum.jpg
$IU3FKWI.jpg	2015-03-24 16:11:42	C:\Users\informant\AppData\Local\Microsoft\Windows\Burn\Burn\Koala.jpg
$IX538VH.jpg	2015-03-24 16:11:42	C:\Users\informant\AppData\Local\Microsoft\Windows\Burn\Burn\Lighthouse.jpg

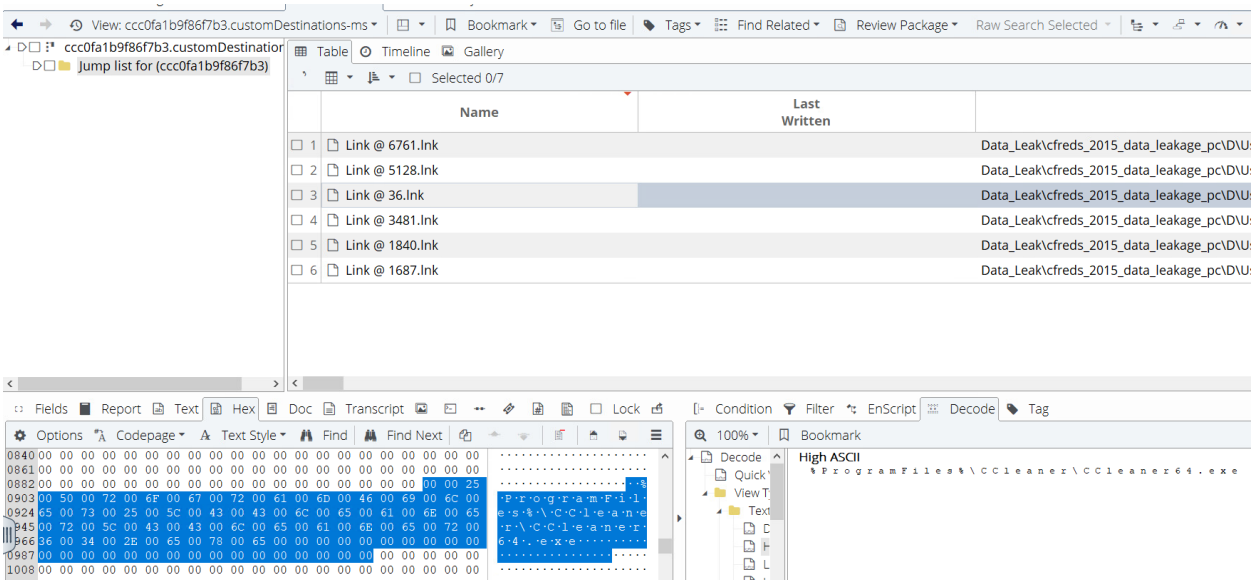


52. What actions were performed for anti-forensics on PC at the last day '2015-03-25'?

Answer:

- **Path:**
  Data_Leak\cfreds_2015_data_leakage_pc\D\Users\informant\AppData\Roaming\Microsoft\Windows\Recent\CustomDestinations\ccc0fa1b9f86f7b3.customDestinations-ms\Jump list for (ccc0fa1b9f86f7b3)\Link @ 36.lnk

Timestamp (EST)	Description
2015-03-25 10:46:44	anti-forensic tools
2015-03-25 10:46:54	eraser
2015-03-25 10:47:34	http://iweb.dl.sourceforge.net/project/eraser/Eraser%206/6.2/Eraser%206.2.0.2962.exe
2015-03-25 10:47:51	ccleaner
2015-03-25 10:48:12	http://www.piriform.com/ccleaner/download
2015-03-25 10:50:14	\USERS\INFORMANT\DESKTOP\DOWNLOAD\ERASER 6.2.0.2962.EXE
2015-03-25 10:57:56	\USERS\INFORMANT\DESKTOP\DOWNLOAD\CCSETUP504.EXE
2015-03-25 11:13:30	\PROGRAM FILES\Eraser\Eraser.exe
2015-03-25 11:13:39 ~ 11:14:44	\User\Informant\Desktop\Temp\Chrysanthemum.jpg \User\Informant\Desktop\Temp\Desert.jpg \User\Informant\Desktop\Temp\Hydrangeas.jpg \User\Informant\Desktop\Temp\IE11-Windows6.1-x64-en-us.exe \User\Informant\Desktop\Temp\Jellyfish.jpg \User\Informant\Desktop\Temp\Koala.jpg \User\Informant\Desktop\Temp\Lighthouse.jpg \User\Informant\Desktop\Temp\Penguins.jpg \User\Informant\Desktop\Temp\Tulips.jpg \User\Informant\Desktop\Temp\Tulips.jpg \User\Informant\Desktop\Temp\
2015-03-25 11:15:45	\Users\informant\Desktop\Download\ccsetup504.exe \Users\informant\Desktop\Download\Eraser 6.2.0.2962.exe
2015-03-25 11:15:50	\PROGRAM FILES\CCLEANER\CCLEANER64.EXE
2015-03-25 11:18:29	\PROGRAM FILES\CCLEANER\UNINST.EXE

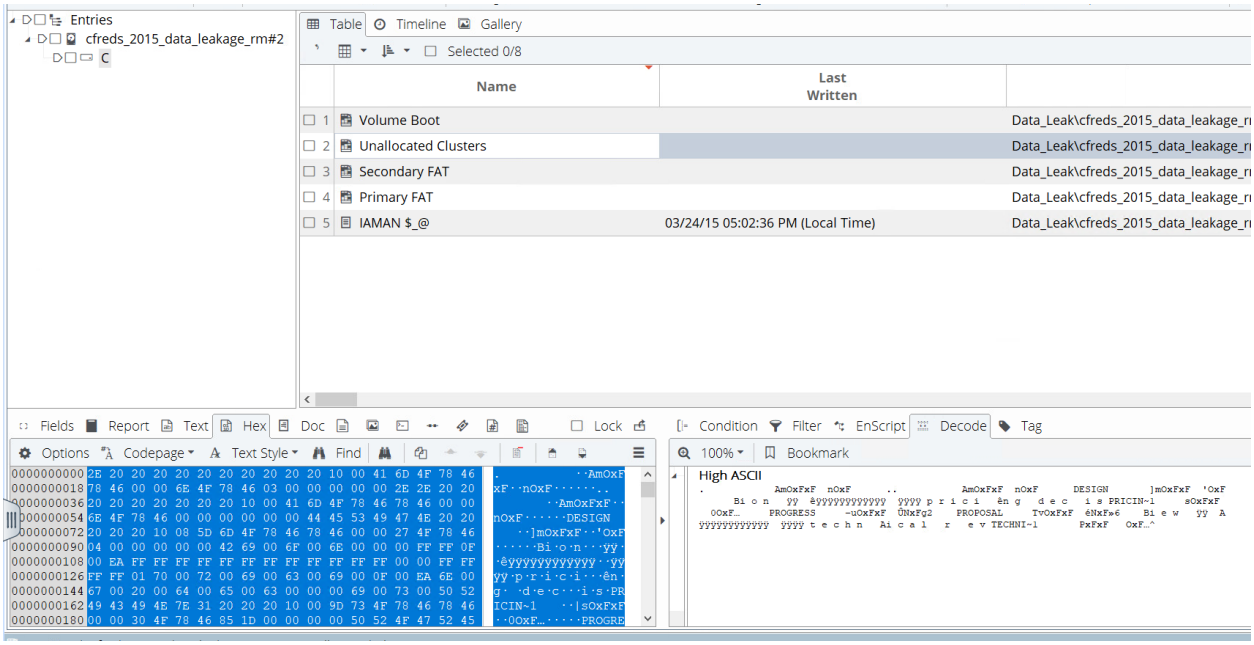


This information suggests that the forensic investigator is examining the $UsnJrnl (Update Sequence Number Journal) file to identify traces of the Eraser tool being used to wipe files.

- **$UsnJrnl:** This is a system file in NTFS that logs file system activities, including file creation, deletion, renaming, and attribute changes. It's a valuable resource for forensic investigations.
- **Eraser:** This is a secure data removal tool that overwrites files with random data to make them unrecoverable.
- **How Eraser Works:** Eraser uses a specific process to wipe files:
    1. **Renames the target file:** It changes the file's name to a random string of bytes.
    2. **Fills with random data:** It overwrites the file's contents with random data multiple times, making it extremely difficult to recover the original data.
- **Wiping Traces in $UsnJrnl:** Even though Eraser aims to securely delete files, it leaves traces of its activity in the $UsnJrnl. These traces can be identified by analyzing the journal entries.

53. Recover deleted files from USB drive ‘RM#2’.

Answer: During the forensic analysis of the RM#2 drive, the traces of directories like DESIGN\, pricing decision, PROGRESS, PROPOSAL, technical review\ were recovered from the unallocated cluster of the USB drive through HEX analysis.



54. What actions were performed for anti-forensics on USB drive ‘RM#2’?
    [Hint: this can be inferred from the results of Question 53.]
55. What files were copied from PC to USB drive ‘RM#2’?
56. Recover hidden files from the CD-R ‘RM#3’.
    How to determine proper filenames of the original files prior to renaming tas
57. What actions were performed for anti-forensics on CD-R ‘RM#3’?

58. Create a detailed timeline of data leakage processes.

Answer: Let's break down this case to create a concise and structured timeline of the data leakage processes:

Phase 1: Reconnaissance and Preparation (March 22nd - 23rd)

- **Normal Business Works (March 22nd):** The suspect appears to be engaged in typical work activities, installing software (Microsoft Office, Internet Explorer, Google Chrome) and setting up accounts (email, user accounts). This could be a cover for establishing the infrastructure needed for later data exfiltration.

- **Researching Data Leakage Methods (March 23rd, 14:01 - 14:21):** The suspect performs extensive web searches related to data leakage, cloud storage, anti-forensics, and data recovery. This indicates an active effort to learn about techniques for exfiltrating and concealing data.

Phase 2: Initial Data Exfiltration (March 23rd)

- **Accessing and Copying Confidential Data (March 23rd, 14:31 - 14:41):** The suspect connects a USB drive ("RM#1"), searches for confidential files using

keywords, and copies those files to their local machine. They then rename the files and their extensions to obfuscate their content.

- **Emailing Data and Links (March 23rd, 14:44 - 16:43):** The suspect sends emails to an external address (spy.conspirator@nist.gov) with messages indicating successful data acquisition. They also upload files to Google Drive and share links to those files via email. Later, they delete the files from Google Drive, possibly to remove evidence.

Phase 3: Expanding Exfiltration and Anti-Forensics (March 24th)

- **Copying More Data (March 24th, 09:38 - 10:07):** After further communication with the external address, the suspect copies more confidential files from a USB drive ("RM#1") and a network share to their local machine. They rename the files and copy them to another USB drive ("RM#2"). They then delete the files from their local machine using "Shift + Delete" to bypass the Recycle Bin.

- **CD-R Burning and Anti-Forensics (March 24th, 15:38 - 17:06):** The suspect practices burning files to a CD-R, copies confidential files to a CD-R with renamed directories, and then formats the CD-R. They burn another copy of the files to a second CD-R ("RM#3") and delete the files from the CD-R. They also format the USB drive ("RM#2") and perform web searches related to CD-R security checkpoints, likely researching ways to avoid detection.

Phase 4: Cleanup and Final Actions (March 25th)

- **Anti-Forensic Activities (March 25th, 10:46 - 11:28):** The suspect downloads and installs anti-forensic tools (Eraser, CCleaner), deletes emails from Outlook, wipes the temporary directory used for CD-R burning, empties the Recycle Bin, uninstalls the anti-forensic tools, logs out of Google Drive, and cleans up their desktop.

- **Resignation and Departure (March 25th, 11:28 - 11:30):** The suspect creates and prints a resignation letter, then shuts down the system and attempts to leave with the USB drive ("RM#2") and the CD-R ("RM#3").

Key Observations:

- **Escalation:** The suspect's actions escalate from seemingly normal work to deliberate data exfiltration and sophisticated anti-forensic activities.

- **Multiple Methods:** The suspect uses a variety of methods to transfer data (email, cloud storage, USB drives, CD-Rs).

- **Obfuscation and Evasion:** The suspect employs renaming, formatting, and secure deletion to hide their actions and evade detection.

- **Anti-Forensics:** The suspect actively uses anti-forensic tools and techniques to remove traces of their activities.

59. List and explain methodologies of data leakage performed by the suspect.

Answer: This data presents a breakdown of the suspect's activities related to potential attempts to transfer confidential data . Multiple approaches were used to transfer the data. Here's a systematic analysis:

1. Network Transmission

- **Email:**
    - **2015-03-23 15:19:** The suspect sent an email with the file space_and_earth.mp4 attached. This suggests potential transfer of a video file via email.
    - **2015-03-23 16:38:** The suspect sent another email containing links to files shared on a cloud storage service. This indicates the suspect might be sharing files indirectly through cloud storage rather than attaching them directly to the email.
- **Cloud Storage Services:**
    - **2015-03-23 16:32:** The suspect uploaded files named happy_holiday.jpg and do_u_wanna_build_a_snow_man.mp3 to a cloud storage service. This implies the use of cloud storage for storing and potentially sharing files.

2. Storage Devices

- **USB Flash Drive:**
    - **2015-03-24 09:58 ~ 10:00:** The suspect copied files, including winter_whether_advisory.zip, to a USB flash drive. This suggests the use of a physical storage device for data transfer or storage.
    - **Formatted Partition:** The suspect formatted the partition on the USB drive, likely in an attempt to erase the data. However, the files still exist in the unused area of the drive, indicating incomplete data erasure. This could be crucial evidence.
- **CD-R:**
    - **2015-03-24 16:54 ~ 16:58:** The suspect burned 17 files, including winter_whether_advisory.zip, onto a CD-R. This indicates the use of optical media for data storage or transfer.

- **Deleted Files:** The suspect attempted to delete confidential files from the CD-R. However, these files persist in the unused area of the disc, suggesting incomplete erasure and potential evidence recovery.

Forensic Implications:

- **Data Exfiltration:** These activities point to potential data exfiltration, where the suspect is attempting to transfer sensitive data outside of the organization's control.
- **Anti-Forensics:** The attempts to format the USB drive and delete files from the CD-R suggest anti-forensic activities aimed at hindering the investigation.
- **Data Recovery:** The presence of files in the unused areas of the USB drive and CD-R indicates the possibility of data recovery using forensic techniques.

60. Create a visual diagram for a summary of results.

Answer: Here is the visually structured timeline infographic of the data leakage event across the specified phases. Let me know if you'd like any adjustments.