Lab Report

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Title:	Volume Shadow Copy Analysis
Case:	25-T104
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Document Revision History

Name	Revision Date	Version	Description
Inor Wang	10/01/2025	0.1	Draft
Inor Wang	10/02/2025	0.2	Draft

Executive Summary

On October 1, 2025, Inor Wang submitted a forensic report to Professor Jacob D. Stauffer documenting an examination of Windows Volume Shadow Copies (VSCs) captured in shadow-copy-capture.vmdk.zip. The objective was to determine whether specific files changed across snapshots, identify co-occurring file modifications, and validate findings at the NTFS/MFT level. The evidence set was verified with MD5, SHA-1, and SHA-256 hashes to preserve integrity and support a defensible chain of custody. The workflow was step-by-step and reproducible, with exact offsets, commands, and screenshots.

Key findings from the examination are as follows:

- **Snapshot Baseline:** The oldest VSC used for comparison was ShadowCopy 7 (2019-01-17 22:15:28, system filestamp). Subsequent analyses references v7-v10.
- **\Docs\text2.txt:** No content change across v7–v10. Timestamps remained constant (Modified 2019-01-17 13:54:31 UTC; Created 13:49:48 UTC; Entry Modified 13:56:44 UTC). Hex analysis of the MFT confirmed a resident $DATA (0x80) stream with Value Length = 0x1C (28 bytes) at offset 0x00D8B154, matching the visible string "Normal Activity in text2.txt." Extra bytes seen in hex were resident-attribute slack/unused space, not logical file content.
- **\Docs\doc3.doc:** Content changed once between v7 and v8.
  - v7 content: "Incriminating Evidence in doc3.doc".
  - v8-v10 content: "Change made to doc3.doc".
  - Correlated timestamp shift: Modified/Entry Modified = 2019-01-17 14:17:31 UTC (v8).
- **\Pictures\drone.jpg:** Content changed twice at v9 and v10, text overlay on image.
  - v7-v8: drone image (no text overlay).
  - v9: same image with text overlay of "Incriminating Evidence in drone.jpg" (Modified/Entry Modified 14:21:53 UTC).
  - v10: same image with text overlay of "Normal Activity in drone.jpg" (Modified/Entry Modified 14:21:53 UTC).
- **Co-occurring file changes in \Docs within ~5 minutes of doc3.doc:** Multiple files were altered in close temporal proximity to the doc3.doc edit (14:17:31 UTC).

    - text4.txt: 14:16:31 UTC (content changed to “Change made to text4.txt”).
    - doc2.doc: 14:19:20 UTC (content changed to “Change made to doc2.doc”).
    - text5.txt: 14:20:15 UTC (content changed to “Change made to text5.txt”).
- **Tool Comparison:**
    - ShadowExplorer: GUI browsing and file export from VSCs; no VSC metadata view.
    - VSSadmin: Metadata-only; no file browsing/export capabilities
    - ShadowCopyView: Combines both, filesystem browsing + export and VSC metadata. This lab was conducted mostly using ShadowCopyView.

The evidence demonstrates that text2.txt remained unchanged across all snapshots, while doc3.doc and drone.jpg exhibited discrete, timestamped content modifications, and text4.txt, doc2.doc, and text5.txt changed within minutes of the doc3.doc edit, consistent with intentional, coordinated activity. Hex-level NTFS review (MFT, $DATA) substantiated logical content lengths and explained residual bytes as attribute slack. As a best practice, examining multiple tools (ShadowExplorer, ShadowCopyView, VSSadmin, WinHex) was essential to reconcile data and metadata views, reduce the risk of tool-specific blind spots, and produce accurate, defensible findings.

The methods and results of this investigation should be considered in the context of learning how to navigate the volume shadow copies to find actionable insights for digital forensics investigations.

Synopsis

A set of Volume Shadow Copies (VSCs) from a Windows 7 system, packaged as shadow-copy-capture.vmdk.zip, was provided for offline analysis. The examiner conducted a forensic review to identify content and metadata changes across four shadow copies, focusing on \Docs\text2.txt, \Docs\doc3.doc, and \Pictures\drone.jpg, and to determine any additional files in \Docs modified within five minutes of doc3.doc. The examiner also located the MFT entry for \Docs\text2.txt in the oldest VSC difference file using a hex editor and explained the findings in the context of NTFS structures. The workflow is step-by-step and reproducible, with explicit tool usage (WinHex/X-Ways, ShadowExplorer, ShadowCopyView/NirSoft, and vssadmin) and annotated screenshots embedded inline.

Client Questions:

1. Determine if the content of the \Docs\text2.txt file changed over the course of the four volume shadow copies in the image. If it did not change, explain how you know this. If it did change, explain how and when the content changed. (By 'explain how,' I mean provide screen print snippets and/or visually describe the change. By 'when,' I mean provide the exact modification date/time stamp when the change took place.)
2. Do the same for \Docs\doc3.doc
3. Do the same for \Pictures\drone.jpg
4. What other file(s) in the Docs folder changed within five minutes of doc3.doc? How and when was it changed?
5. Using a hex editor, find the MFT entry for \Docs\text2.txt in the oldest VSC difference file. Provide a screen print of the sector containing the file content. Describe and explain what you see, relative to the NTFS file system.
6. Compare (what's similar?) and contrast (what's different) with regard to the data and metadata parsed by ShadowExplorer (shadowexplorer.com), ShadowCopyView (NirSoft.net), and VSSadmin (native, built-in Windows command line utility).

Scope of Work:

- Acquisition of the evidence file from Professor Stauffer in the UTSA Canvas website.
- Analysis of shadow copy directory capture using WinHex, ShadowExplorer, ShadowCopyView, and VSSadmin.
- Verification of evidentiary integrity using MD5, SHA1, and SHA256 cryptographic hashes.

Evidence Analyzed

This section provides details of the digital evidence collected

Evidence ID	**E001**
Name	shadow-copy-capture.vmdk.zip
Type	Zip archive data, at least v2.0 to extract, compression method=deflate
Size	5.78 MB
MD5	1FC73360C4B3933ED966B7EFB51EE69A
SHA1	FFCABE3438B90DC3B88EFD2D5DBDDFA32C445062
SHA256	43A0F545832909256EB901FAFD5EB273842528E4B7583198CDC57134E35434F7

Tools Used

Workstation

Hostname	Operating System	Build	Physical / Virtual	Built
IS-4523-001-WINDOWS	Windows 11	2021	Virtual	09/06/2025

Software

Name	Version	Release	Purpose
WinHex (X-Ways)	21.0	Jun 2025	Hex/disk/RAM editor; examine and carve artifacts (incl. Registry hives) and image media
Shadow Explorer	0.9.462	Sep 2016	Enumerate Shadow Copies and export earlier versions of files/folders
ShadowCopyView (NirSoft)	1.16	Dec 2023	View shadow snapshots; copy out previous file versions for analysis
VSSadmin (Microsoft)	N/A	Sep 2025	List/manage shadow copies & storage
FTK Imager (AccessData)	4.5.0.3	Sep 2020	Mounts the .VMDK file, enabling analysis of volume shadow copies
LibreOffice Writer (The Document Foundation)	25.8.1.1	Aug 2025	Word processing; used to read contents of .doc files
Notepad (Microsoft)	11.2507.26.0	Sep 2025	Plain text editing; used to read contents of .txt files
Photos (Microsoft)	2025.11080.28001.0	Sep 2025	Image viewing and basic editing; used to view contents of .jpg files

Analysis Findings

Overview of Examination Procedures

The forensic analysis of the provided **Volume Shadow Copies (VSCs)**, captured in shadow-copy-capture.vmdk.zip and supplied by Professor Stauffer, was conducted by the **examiner** on a mounted Windows 7 volume. The evidence set was verified via **MD5, SHA-1, and SHA-256** to ensure integrity and a defensible chain of custody. The examiner performed a step-by-step, reproducible workflow with **inline screenshots** and exact commands/paths, in accordance with the assignment rubric and required template.

Additional targeted analysis was performed using:

- **WinHex (X-Ways)** → to examine NTFS structures, locate the \Docs\text2.txt MFT record in the oldest VSC difference file, and capture hex-level screenshots tied to sector/offset references.
- **ShadowExplorer** → to enumerate shadow copies, browse prior file versions (e.g., \Docs\text2.txt, \Docs\doc3.doc, \Pictures\drone.jpg), and export items for comparison across the four VSCs.
- **ShadowCopyView (NirSoft)** → to list and inspect VSC snapshots, correlate snapshot creation times with file modification events, and extract prior versions for side-by-side content/metadata comparison.
- **VSSadmin (Microsoft)** → to validate shadow storage and snapshot inventory (vssadmin list shadows, vssadmin list shadowstorage) and to timestamp snapshots for "when" analyses.
- **FTK Imager (AccessData)** → mounted the .vmdk file, allowing the examiner to analyze of the volume shadow copies using external tools listed previously.

Throughout the process, all findings were documented, and cryptographic hash values were maintained for validation.

Evidence Reviewed

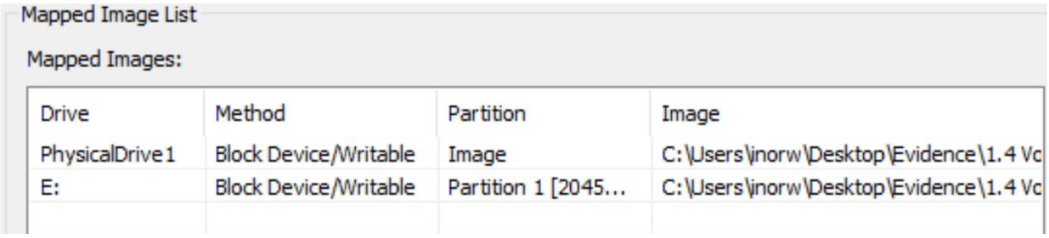
1. **shadow-copy-capture.vmdk.zip (E001)**: Shadow copy directory capture

Key Findings

1. Determine if the content of the \Docs\text2.txt file changed over the course of the four volume shadow copies in the image. If it did not change, explain how you know this. If it did change, explain how and when the content changed. (By 'explain how,' I mean provide screen print snippets and/or visually describe the change. By 'when,' I mean provide the exact modification date/time stamp when the change took place.)

- **Analysis Performed:**
    - The volume shadow copies of "Windows 7 Shadow 20190117.vmdk" was analyzed through NirSoft's ShadowCopyView application.
    - The "Windows 7 Shadow 20190117.vmdk" image file was mounted to the filesystem with write permissions through AccessData's FTK Imager application as shown in Figure 1.
    - The examiner analyzed the Modified Time, Created Time, and Entry Modified Time of text2.txt throughout all volume shadow copies as shown in Figures 2-5.
        - The modified time (01/17/2019 1:54:31 PM UTC), created time (01/17/2019 1:49:48 PM UTC), and entry modified time (01/17/2019 1:56:44 PM UTC) are all the same amongst all volume shadow copies.
    - The examiner copied text2.txt file from all volume shadow copies to the filesystem as shown in Figure 6.
    - The examiner accessed text2.txt file from all volume shadow copies, as shown in Figure 7, to examine the contents to determine if the file's contents have been changed.
        - The content of the .txt file stay the same amongst all volume shadow copies. The content is: "Normal Activity in text2.txt"
- **Answer:**
  The content of \Docs\text2.txt file has NOT changed over the course of the four volume shadow copies in the image. As shown in Figures 2-5, the Modified Time, Created Time, and Entry Modified Time of text2.txt has stayed consistent amongst all volume shadow copies. Additionally, the examiner copied text2.txt file onto his filesystem and the examiner accessed each .txt file to view the contents as shown in Figure 6 and 7. The contents stayed consistent amongst all volume shadow copies. **Therefore again, the content of \Docs\text2.txt has NOT changed over the course of the four volume shadow copies as shown in Figures 2-7.**

- **Supporting Evidence:**

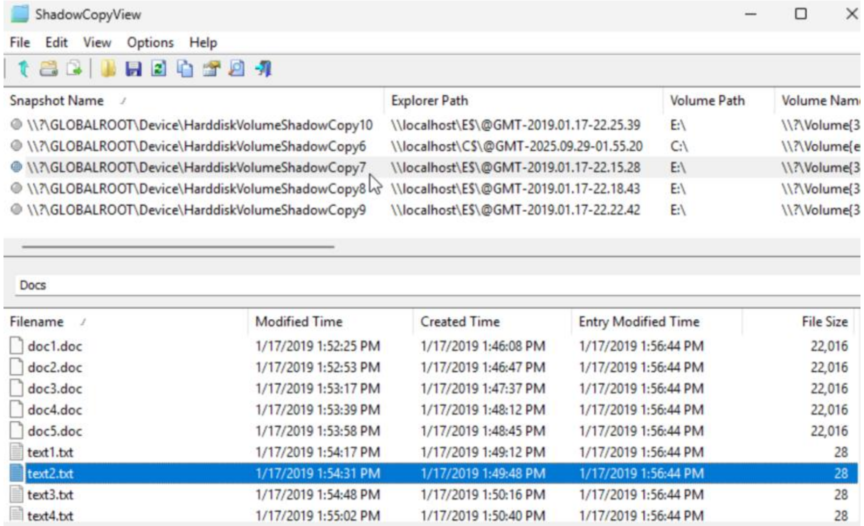


Mapped Image List

Mapped Images:

Drive	Method	Partition	Image
PhysicalDrive1	Block Device/Writable	Image	C:\Users\jnorw\Desktop\Evidence\1.4 Vc
E:	Block Device/Writable	Partition 1 [2045...	C:\Users\jnorw\Desktop\Evidence\1.4 Vc

Figure 1. The "Windows 7 Shadow 20190117.vmdk" image file mounted as E: with writable settings on

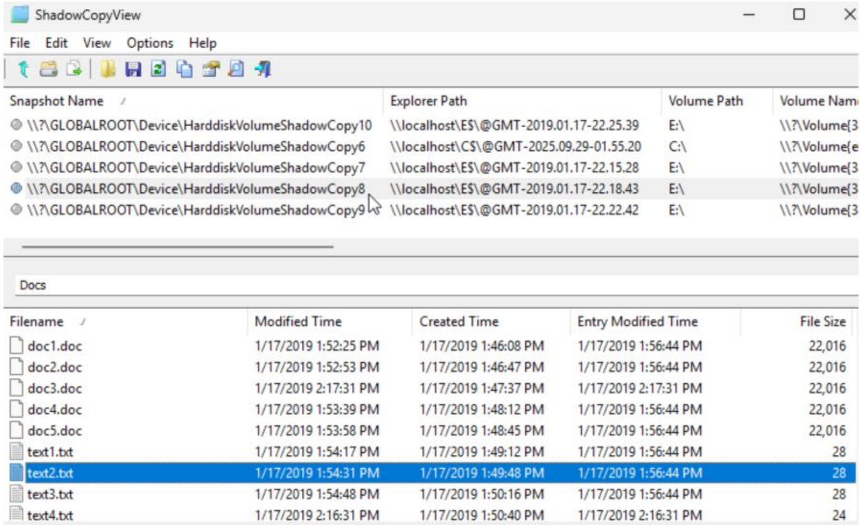


Snapshot Name	Explorer Path	Volume Path	Volume Nam
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy10	\\localhost\E$\@GMT-2019.01.17-22.25.39	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy6	\\localhost\C$\@GMT-2025.09.29-01.55.20	C:\	\\?\Volume{e
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy7	\\localhost\E$\@GMT-2019.01.17-22.15.28	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy8	\\localhost\E$\@GMT-2019.01.17-22.18.43	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy9	\\localhost\E$\@GMT-2019.01.17-22.22.42	E:\	\\?\Volume{3

Docs

Filename	Modified Time	Created Time	Entry Modified Time	File Size
doc1.doc	1/17/2019 1:52:25 PM	1/17/2019 1:46:08 PM	1/17/2019 1:56:44 PM	22,016
doc2.doc	1/17/2019 1:52:53 PM	1/17/2019 1:46:47 PM	1/17/2019 1:56:44 PM	22,016
doc3.doc	1/17/2019 1:53:17 PM	1/17/2019 1:47:37 PM	1/17/2019 1:56:44 PM	22,016
doc4.doc	1/17/2019 1:53:39 PM	1/17/2019 1:48:12 PM	1/17/2019 1:56:44 PM	22,016
doc5.doc	1/17/2019 1:53:58 PM	1/17/2019 1:48:45 PM	1/17/2019 1:56:44 PM	22,016
text1.txt	1/17/2019 1:54:17 PM	1/17/2019 1:49:12 PM	1/17/2019 1:56:44 PM	28
text2.txt	1/17/2019 1:54:31 PM	1/17/2019 1:49:48 PM	1/17/2019 1:56:44 PM	28
text3.txt	1/17/2019 1:54:48 PM	1/17/2019 1:50:16 PM	1/17/2019 1:56:44 PM	28
text4.txt	1/17/2019 1:55:02 PM	1/17/2019 1:50:40 PM	1/17/2019 1:56:44 PM	28

Figure 2. Metadata of text2.txt in volume shadow copy v7 within ShadowCopyView

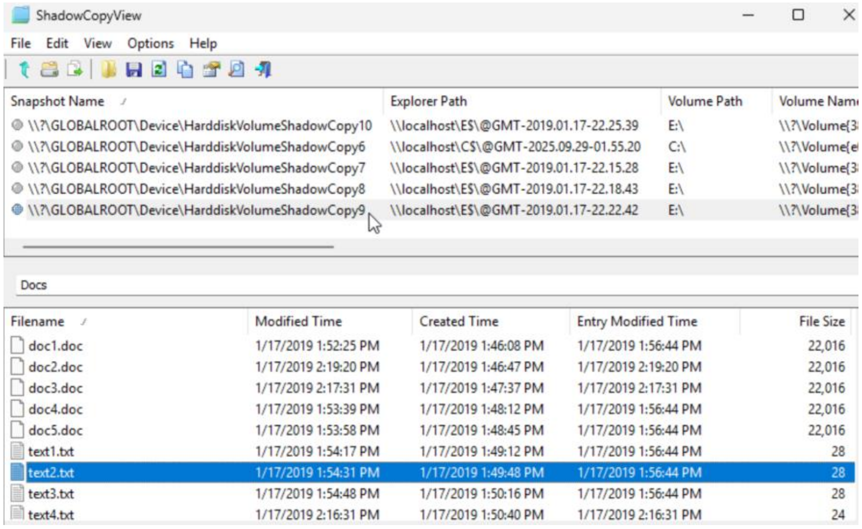


Snapshot Name	Explorer Path	Volume Path	Volume Nam
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy10	\\localhost\E$\@GMT-2019.01.17-22.25.39	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy6	\\localhost\C$\@GMT-2025.09.29-01.55.20	C:\	\\?\Volume{e
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy7	\\localhost\E$\@GMT-2019.01.17-22.15.28	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy8	\\localhost\E$\@GMT-2019.01.17-22.18.43	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy9	\\localhost\E$\@GMT-2019.01.17-22.22.42	E:\	\\?\Volume{3

Docs

Filename	Modified Time	Created Time	Entry Modified Time	File Size
doc1.doc	1/17/2019 1:52:25 PM	1/17/2019 1:46:08 PM	1/17/2019 1:56:44 PM	22,016
doc2.doc	1/17/2019 1:52:53 PM	1/17/2019 1:46:47 PM	1/17/2019 1:56:44 PM	22,016
doc3.doc	1/17/2019 2:17:31 PM	1/17/2019 1:47:37 PM	1/17/2019 2:17:31 PM	22,016
doc4.doc	1/17/2019 1:53:39 PM	1/17/2019 1:48:12 PM	1/17/2019 1:56:44 PM	22,016
doc5.doc	1/17/2019 1:53:58 PM	1/17/2019 1:48:45 PM	1/17/2019 1:56:44 PM	22,016
text1.txt	1/17/2019 1:54:17 PM	1/17/2019 1:49:12 PM	1/17/2019 1:56:44 PM	28
text2.txt	1/17/2019 1:54:31 PM	1/17/2019 1:49:48 PM	1/17/2019 1:56:44 PM	28
text3.txt	1/17/2019 1:54:48 PM	1/17/2019 1:50:16 PM	1/17/2019 1:56:44 PM	28
text4.txt	1/17/2019 2:16:31 PM	1/17/2019 1:50:40 PM	1/17/2019 2:16:31 PM	24

Figure 3. Metadata of text2.txt in volume shadow copy v8 within ShadowCopyView

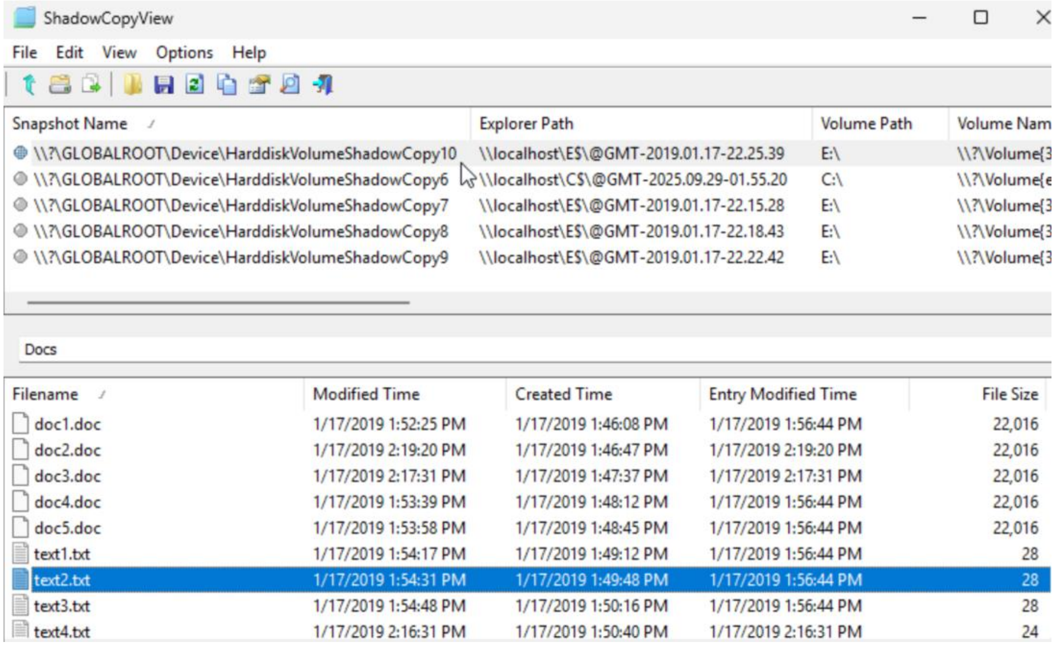


Snapshot Name	Explorer Path	Volume Path	Volume Nam
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy10	\\localhost\E$\@GMT-2019.01.17-22.25.39	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy6	\\localhost\C$\@GMT-2025.09.29-01.55.20	C:\	\\?\Volume{e
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy7	\\localhost\E$\@GMT-2019.01.17-22.15.28	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy8	\\localhost\E$\@GMT-2019.01.17-22.18.43	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy9	\\localhost\E$\@GMT-2019.01.17-22.22.42	E:\	\\?\Volume{3

Docs

Filename	Modified Time	Created Time	Entry Modified Time	File Size
doc1.doc	1/17/2019 1:52:25 PM	1/17/2019 1:46:08 PM	1/17/2019 1:56:44 PM	22,016
doc2.doc	1/17/2019 2:19:20 PM	1/17/2019 1:46:47 PM	1/17/2019 2:19:20 PM	22,016
doc3.doc	1/17/2019 2:17:31 PM	1/17/2019 1:47:37 PM	1/17/2019 2:17:31 PM	22,016
doc4.doc	1/17/2019 1:53:39 PM	1/17/2019 1:48:12 PM	1/17/2019 1:56:44 PM	22,016
doc5.doc	1/17/2019 1:53:58 PM	1/17/2019 1:48:45 PM	1/17/2019 1:56:44 PM	22,016
text1.txt	1/17/2019 1:54:17 PM	1/17/2019 1:49:12 PM	1/17/2019 1:56:44 PM	28
text2.txt	1/17/2019 1:54:31 PM	1/17/2019 1:49:48 PM	1/17/2019 1:56:44 PM	28
text3.txt	1/17/2019 1:54:48 PM	1/17/2019 1:50:16 PM	1/17/2019 1:56:44 PM	28
text4.txt	1/17/2019 2:16:31 PM	1/17/2019 1:50:40 PM	1/17/2019 2:16:31 PM	24

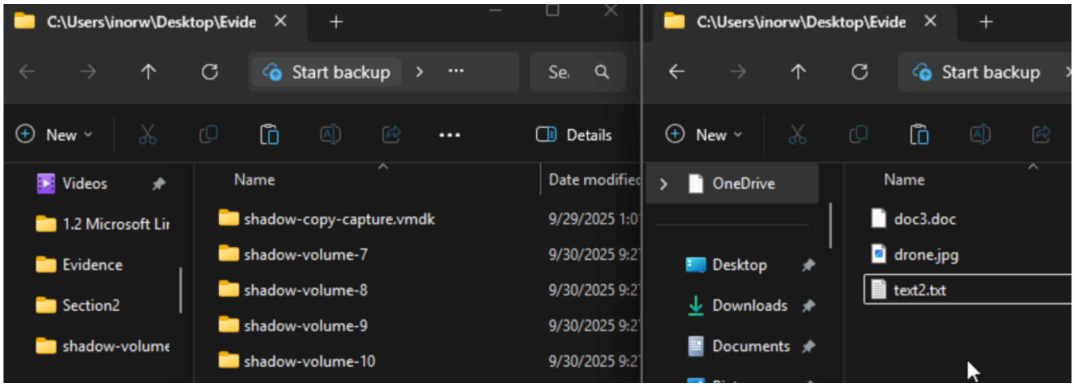
Figure 4. Metadata of text2.txt in volume shadow copy v9 within ShadowCopyView



Snapshot Name	Explorer Path	Volume Path	Volume Nam
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy10	\\localhost\E$\@GMT-2019.01.17-22.25.39	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy6	\\localhost\C$\@GMT-2025.09.29-01.55.20	C:\	\\?\Volume{e
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy7	\\localhost\E$\@GMT-2019.01.17-22.15.28	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy8	\\localhost\E$\@GMT-2019.01.17-22.18.43	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy9	\\localhost\E$\@GMT-2019.01.17-22.22.42	E:\	\\?\Volume{3

Filename	Modified Time	Created Time	Entry Modified Time	File Size
doc1.doc	1/17/2019 1:52:25 PM	1/17/2019 1:46:08 PM	1/17/2019 1:56:44 PM	22,016
doc2.doc	1/17/2019 2:19:20 PM	1/17/2019 1:46:47 PM	1/17/2019 2:19:20 PM	22,016
doc3.doc	1/17/2019 2:17:31 PM	1/17/2019 1:47:37 PM	1/17/2019 2:17:31 PM	22,016
doc4.doc	1/17/2019 1:53:39 PM	1/17/2019 1:48:12 PM	1/17/2019 1:56:44 PM	22,016
doc5.doc	1/17/2019 1:53:58 PM	1/17/2019 1:48:45 PM	1/17/2019 1:56:44 PM	22,016
text1.txt	1/17/2019 1:54:17 PM	1/17/2019 1:49:12 PM	1/17/2019 1:56:44 PM	28
text2.txt	1/17/2019 1:54:31 PM	1/17/2019 1:49:48 PM	1/17/2019 1:56:44 PM	28
text3.txt	1/17/2019 1:54:48 PM	1/17/2019 1:50:16 PM	1/17/2019 1:56:44 PM	28
text4.txt	1/17/2019 2:16:31 PM	1/17/2019 1:50:40 PM	1/17/2019 2:16:31 PM	24

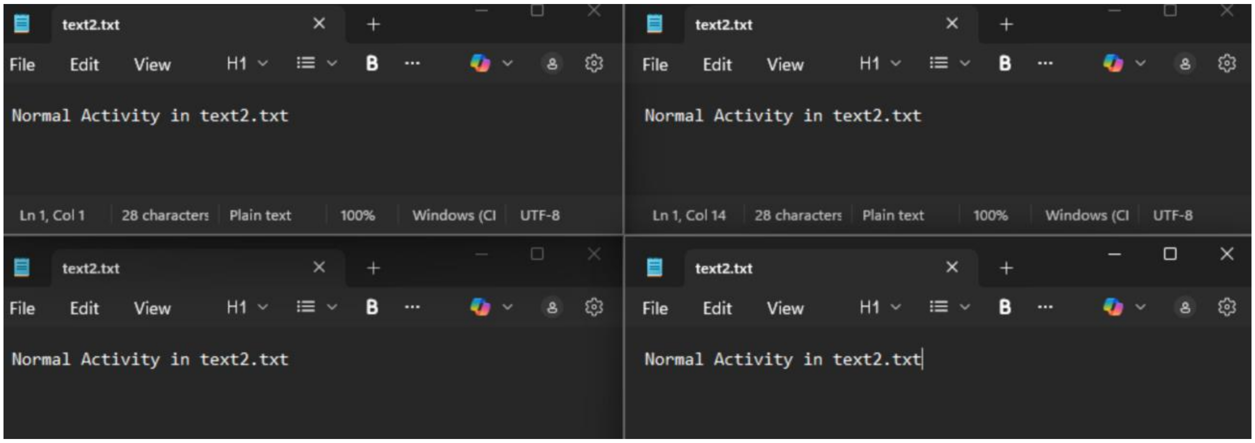
Figure 5. Metadata of text2.txt in volume shadow copy v10 within ShadowCopyView



Name	Date modified
shadow-copy-capture.vmdk	9/29/2025 1:0
shadow-volume-7	9/30/2025 9:2
shadow-volume-8	9/30/2025 9:2
shadow-volume-9	9/30/2025 9:2
shadow-volume-10	9/30/2025 9:2

Name
doc3.doc
drone.jpg
text2.txt

Figure 6. Showing filesystem containing four directories named, "shadow-volume-" (7-10), containing: doc3.doc, drone.jpg, and text2.txt. These files were copied from their corresponding volume shadow copy within ShadowCopyView*



```
Normal Activity in text2.txt
```

```
Ln 1, Col 1 | 28 characters | Plain text | 100% | Windows (CI | UTF-8
```

```
Normal Activity in text2.txt
```

```
Ln 1, Col 14 | 28 characters | Plain text | 100% | Windows (CI | UTF-8
```

```
Normal Activity in text2.txt
```

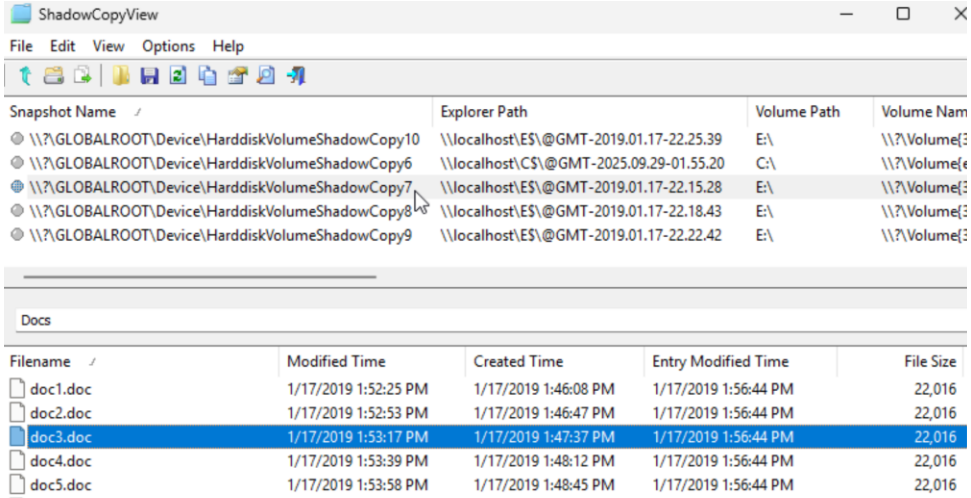
```
Normal Activity in text2.txt
```

Figure 7. All four text2.txt from volume shadow copy v7-10 accessed via Windows 11 Notepad (showing no content change)

2. Do the same for \Docs\doc3.doc

- **Analysis Performed:**
  - The volume shadow copies of "Windows 7 Shadow 20190117.vmdk" was analyzed through NirSoft's ShadowCopyView application.
  - The examiner analyzed the Modified Time, Created Time, and Entry Modified Time of doc3.doc throughout all volume shadow copies as shown in Figures 8-11.
    - doc3.doc within volume shadow copy v7:
      - Modified time is *01/17/2019 1:53:17 PM UTC*
      - Created time is *01/17/2019 1:47:37 PM UTC*
      - Entry modified time is *01/17/2019 1:56:44 PM UTC*
    - doc3.doc within volume shadow copy v8:
      - Modified time is *01/17/2019 2:17:31 PM UTC*
      - Created time is *01/17/2019 1:47:37 PM UTC*
      - Entry modified time is *01/17/2019 2:17:31 PM UTC*
    - doc3.doc within volume shadow copy v9:
      - Modified time is *01/17/2019 2:17:31 PM UTC*
      - Created time is *01/17/2019 1:47:37 PM UTC*
      - Entry modified time is *01/17/2019 2:17:31 PM UTC*
    - doc3.doc within volume shadow copy v10:
      - Modified time is *01/17/2019 2:17:31 PM UTC*
      - Created time is *01/17/2019 1:47:37 PM UTC*
      - Entry modified time is *01/17/2019 2:17:31 PM UTC*
  - The examiner accessed doc3.doc file from all volume shadow copies, as shown in Figure 12, to examine the contents to determine if the file's contents have been changed.
    - The content of the .doc file has **not stayed the same** amongst all volume shadow copies.
    - The content of doc3.doc within the volume shadow copy v7 is: "Incriminating Evidence in doc3.doc"
    - The content of doc3.doc within the volume shadow copy v8-10 is: "Change made to doc3.doc"
- **Answer:**
  The content of \Docs\doc3.doc file has changed over the course of the four volume shadow copies in the image. As shown in Figure 12, the content of doc3.doc within the volume shadow copy v7 was "Incriminating Evidence in doc3.doc" and then was changed to "Change made to doc3.doc" within the volume shadow copy v8 and stayed the same all in volume shadow copy v9-10. Additionally, the modified and entry modified time changed from 01/17/2019 1:53:17 PM UTC (doc3.doc within volume shadow copy v7) to 01/17/2019 2:17:31 PM UTC (doc3.doc within volume shadow copy v8) as shown in Figures 8 and 9. **Therefore in conclusion, the content of \Docs\doc3.doc was changed from "Incriminating Evidence in doc3.doc" to "Change made to doc3.doc" at 01/17/2019 2:17:31 PM UTC from volume shadow copy v7 to v8, as shown in Figures 8-12.**

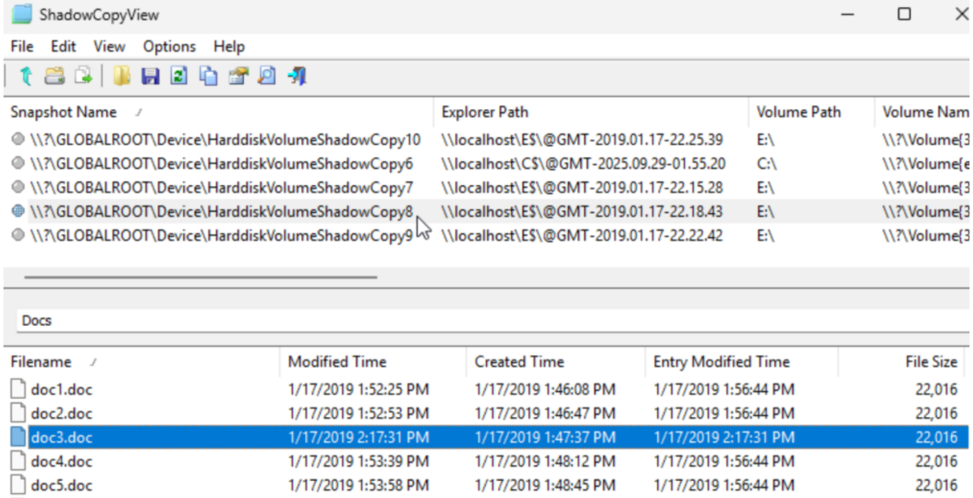
- **Supporting Evidence:**



Snapshot Name	Explorer Path	Volume Path	Volume Nam
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy10	\\localhost\E$\@GMT-2019.01.17-22.25.39	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy6	\\localhost\C$\@GMT-2025.09.29-01.55.20	C:\	\\?\Volume{e
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy7	\\localhost\E$\@GMT-2019.01.17-22.15.28	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy8	\\localhost\E$\@GMT-2019.01.17-22.18.43	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy9	\\localhost\E$\@GMT-2019.01.17-22.22.42	E:\	\\?\Volume{3

Filename	Modified Time	Created Time	Entry Modified Time	File Size
doc1.doc	1/17/2019 1:52:25 PM	1/17/2019 1:46:08 PM	1/17/2019 1:56:44 PM	22,016
doc2.doc	1/17/2019 1:52:53 PM	1/17/2019 1:46:47 PM	1/17/2019 1:56:44 PM	22,016
doc3.doc	1/17/2019 1:53:17 PM	1/17/2019 1:47:37 PM	1/17/2019 1:56:44 PM	22,016
doc4.doc	1/17/2019 1:53:39 PM	1/17/2019 1:48:12 PM	1/17/2019 1:56:44 PM	22,016
doc5.doc	1/17/2019 1:53:58 PM	1/17/2019 1:48:45 PM	1/17/2019 1:56:44 PM	22,016

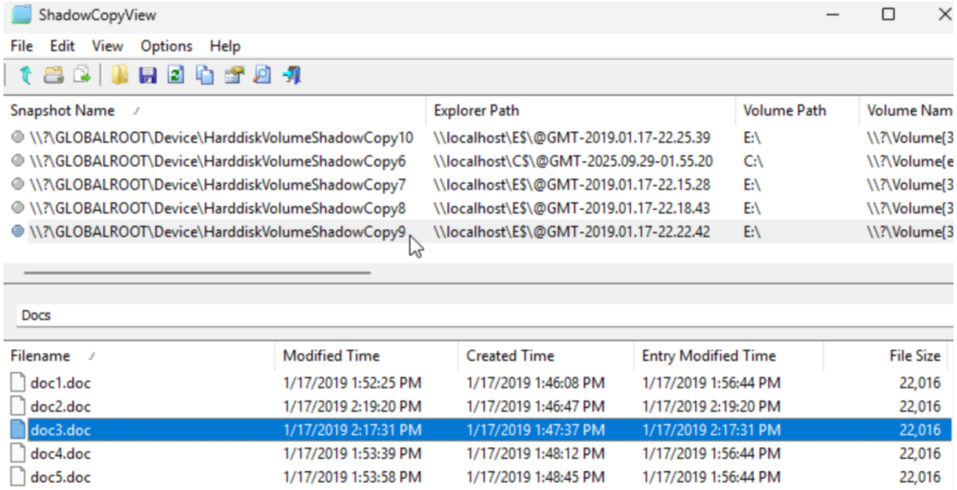
Figure 8. Metadata of doc3.doc in volume shadow copy v7 within ShadowCopyView



Snapshot Name	Explorer Path	Volume Path	Volume Nam
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy10	\\localhost\E$\@GMT-2019.01.17-22.25.39	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy6	\\localhost\C$\@GMT-2025.09.29-01.55.20	C:\	\\?\Volume{e
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy7	\\localhost\E$\@GMT-2019.01.17-22.15.28	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy8	\\localhost\E$\@GMT-2019.01.17-22.18.43	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy9	\\localhost\E$\@GMT-2019.01.17-22.22.42	E:\	\\?\Volume{3

Filename	Modified Time	Created Time	Entry Modified Time	File Size
doc1.doc	1/17/2019 1:52:25 PM	1/17/2019 1:46:08 PM	1/17/2019 1:56:44 PM	22,016
doc2.doc	1/17/2019 1:52:53 PM	1/17/2019 1:46:47 PM	1/17/2019 1:56:44 PM	22,016
doc3.doc	1/17/2019 2:17:31 PM	1/17/2019 1:47:37 PM	1/17/2019 2:17:31 PM	22,016
doc4.doc	1/17/2019 1:53:39 PM	1/17/2019 1:48:12 PM	1/17/2019 1:56:44 PM	22,016
doc5.doc	1/17/2019 1:53:58 PM	1/17/2019 1:48:45 PM	1/17/2019 1:56:44 PM	22,016

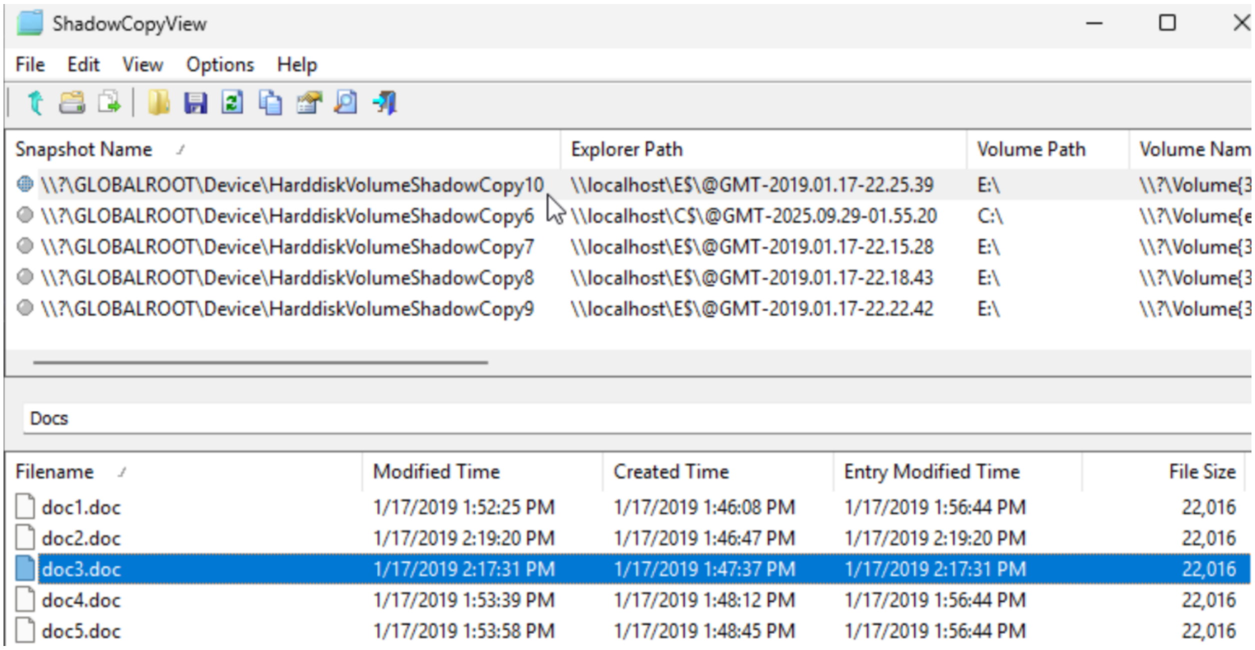
Figure 9. Metadata of doc3.doc in volume shadow copy v8 within ShadowCopyView



Snapshot Name	Explorer Path	Volume Path	Volume Nam
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy10	\\localhost\E$\@GMT-2019.01.17-22.25.39	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy6	\\localhost\C$\@GMT-2025.09.29-01.55.20	C:\	\\?\Volume{e
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy7	\\localhost\E$\@GMT-2019.01.17-22.15.28	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy8	\\localhost\E$\@GMT-2019.01.17-22.18.43	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy9	\\localhost\E$\@GMT-2019.01.17-22.22.42	E:\	\\?\Volume{3

Filename	Modified Time	Created Time	Entry Modified Time	File Size
doc1.doc	1/17/2019 1:52:25 PM	1/17/2019 1:46:08 PM	1/17/2019 1:56:44 PM	22,016
doc2.doc	1/17/2019 2:19:20 PM	1/17/2019 1:46:47 PM	1/17/2019 2:19:20 PM	22,016
doc3.doc	1/17/2019 2:17:31 PM	1/17/2019 1:47:37 PM	1/17/2019 2:17:31 PM	22,016
doc4.doc	1/17/2019 1:53:39 PM	1/17/2019 1:48:12 PM	1/17/2019 1:56:44 PM	22,016
doc5.doc	1/17/2019 1:53:58 PM	1/17/2019 1:48:45 PM	1/17/2019 1:56:44 PM	22,016

Figure 10. Metadata of doc3.doc in volume shadow copy v9 within ShadowCopyView

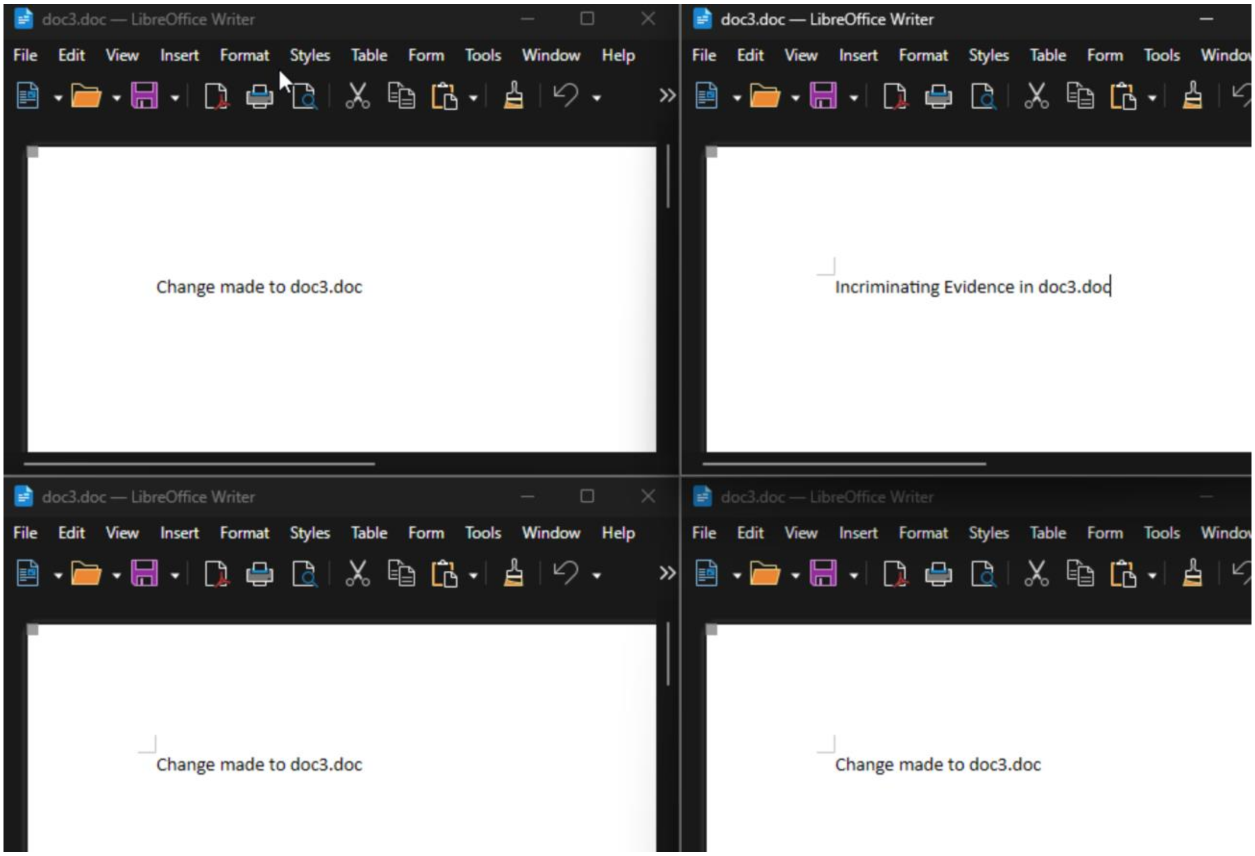


Snapshot Name	Explorer Path	Volume Path	Volume Nam
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy10	\\localhost\E$\@GMT-2019.01.17-22.25.39	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy6	\\localhost\C$\@GMT-2025.09.29-01.55.20	C:\	\\?\Volume{e
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy7	\\localhost\E$\@GMT-2019.01.17-22.15.28	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy8	\\localhost\E$\@GMT-2019.01.17-22.18.43	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy9	\\localhost\E$\@GMT-2019.01.17-22.22.42	E:\	\\?\Volume{3

Docs

Filename	Modified Time	Created Time	Entry Modified Time	File Size
doc1.doc	1/17/2019 1:52:25 PM	1/17/2019 1:46:08 PM	1/17/2019 1:56:44 PM	22,016
doc2.doc	1/17/2019 2:19:20 PM	1/17/2019 1:46:47 PM	1/17/2019 2:19:20 PM	22,016
doc3.doc	1/17/2019 2:17:31 PM	1/17/2019 1:47:37 PM	1/17/2019 2:17:31 PM	22,016
doc4.doc	1/17/2019 1:53:39 PM	1/17/2019 1:48:12 PM	1/17/2019 1:56:44 PM	22,016
doc5.doc	1/17/2019 1:53:58 PM	1/17/2019 1:48:45 PM	1/17/2019 1:56:44 PM	22,016

Figure 11. Metadata of doc3.doc in volume shadow copy v10 within ShadowCopyView


doc3.doc — LibreOffice Writer
File Edit View Insert Format Styles Table Form Tools Window Help
doc3.doc — LibreOffice Writer
File Edit View Insert Format Styles Table Form Tools Windo
doc3.doc — LibreOffice Writer
File Edit View Insert Format Styles Table Form Tools Window Help
doc3.doc — LibreOffice Writer
File Edit View Insert Format Styles Table Form Tools Windo

Change made to doc3.doc

Incriminating Evidence in doc3.doc

Change made to doc3.doc

Change made to doc3.doc

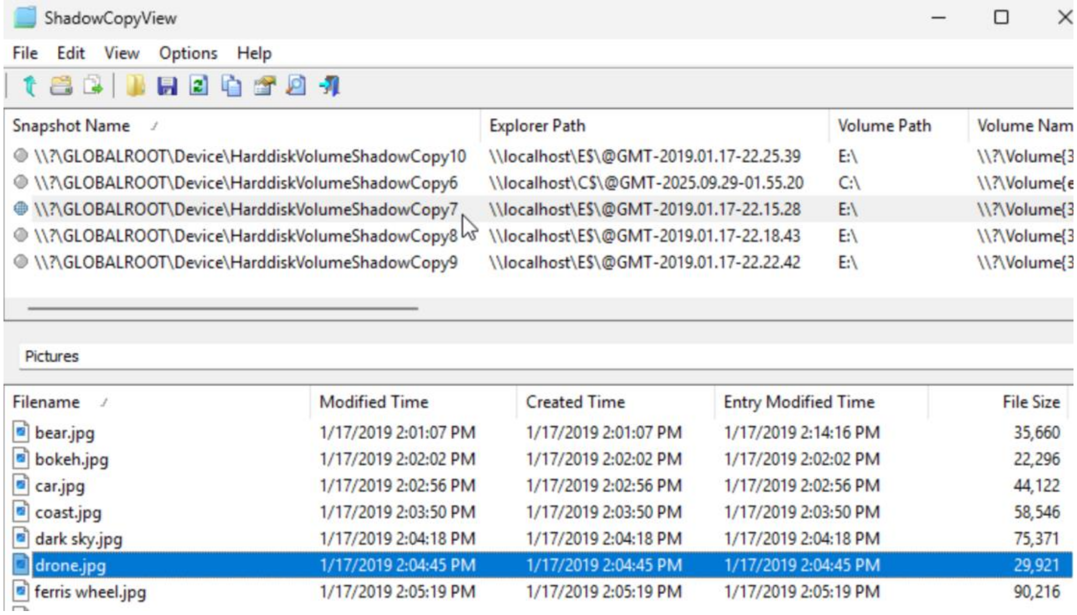
Figure 12. All four doc3.doc from volume shadow copy v7-10 accessed via LibreOffice Writer (showing content change)

3. Do the same for \Pictures\drone.jpg

- **Analysis Performed:**
  - The volume shadow copies of "Windows 7 Shadow 20190117.vmdk" was analyzed through NirSoft's ShadowCopyView application.
  - The examiner analyzed the Modified Time, Created Time, and Entry Modified Time of drone.jpg throughout all volume shadow copies as shown in Figures 13-16.
    - drone.jpg within volume shadow copy v7:
      - Modified time is *01/17/2019 2:04:45 PM UTC*
      - Created time is *01/17/2019 2:04:45 PM UTC*
      - Entry modified time is *01/17/2019 2:04:45 PM UTC*
    - drone.jpg within volume shadow copy v8:
      - Modified time is *01/17/2019 2:04:45 PM UTC*
      - Created time is *01/17/2019 2:04:45 PM UTC*
      - Entry modified time is *01/17/2019 2:04:45 PM UTC*
    - drone.jpg within volume shadow copy v9:
      - Modified time is *01/17/2019 2:21:53 PM UTC*
      - Created time is *01/17/2019 2:04:45 PM UTC*
      - Entry modified time is *01/17/2019 2:21:53 PM UTC*
    - drone.jpg within volume shadow copy v10:
      - Modified time is *01/17/2019 2:24:12 PM UTC*
      - Created time is *01/17/2019 2:04:45 PM UTC*
      - Entry modified time is *01/17/2019 2:24:12 PM UTC*
  - The examiner accessed drone.jpg file from all volume shadow copies, as shown in Figure 17-18, to examine the contents to determine if the file's contents have been changed.
    - The content of the .jpg file has **not stayed the same** amongst all volume shadow copies.
    - The content of drone.jpg within the volume shadow copy v7-8 contains an image of a drone.
    - The content of drone.jpg within the volume shadow copy v9 contains an image of a drone and a text overlay stating: "Incriminating Evidence in drone.jpg".
    - The content of drone.jpg within the volume shadow copy v10 contains an image of a drone and a text overlay stating: "Normal activity in drone.jpg".
- **Answer:**
  The content of \Pictures\drone.jpg file has changed over the course of the four volume shadow copies in the image. As shown in Figure 17, the content of drone.jpg within volume shadow copy v7-8 contained a picture of a drone, then was changed to the same picture of a drone but with text overlay stating "Incriminating Evidence in drone.jpg" within drone.jpg in volume shadow copy v9, and then lastly was changed to the same picture of a drone but with text overlay stating "Normal Activity in drone.jpg". Additionally, the modified and entry modified time changed from 01/17/2019 2:04:45 PM UTC (drone.jpg in volume shadow copy v7-8) to 01/17/2019 2:21:53 PM UTC (drone.jpg in volume shadow copy v9) and then to 01/17/2019 2:24:12 PM UTC (drone.jpg in volume shadow copy v10) as shown in Figures 17 and 18. **Therefore in**

conclusion, the content of \Pictures\drone.jpg was changed. The content started out as an image of a drone (volume shadow copy v7-8), then to the same image with text overlay stating "Incriminating Evidence in drone.jpg" (volume shadow copy v9), and then to the same image with text overlay stating "Normal Activity in drone.jpg" (volume shadow copy v10). The content was modified at 01/17/2019 2:21:53 PM UTC and 01/17/2019 2:24:12 PM UTC.

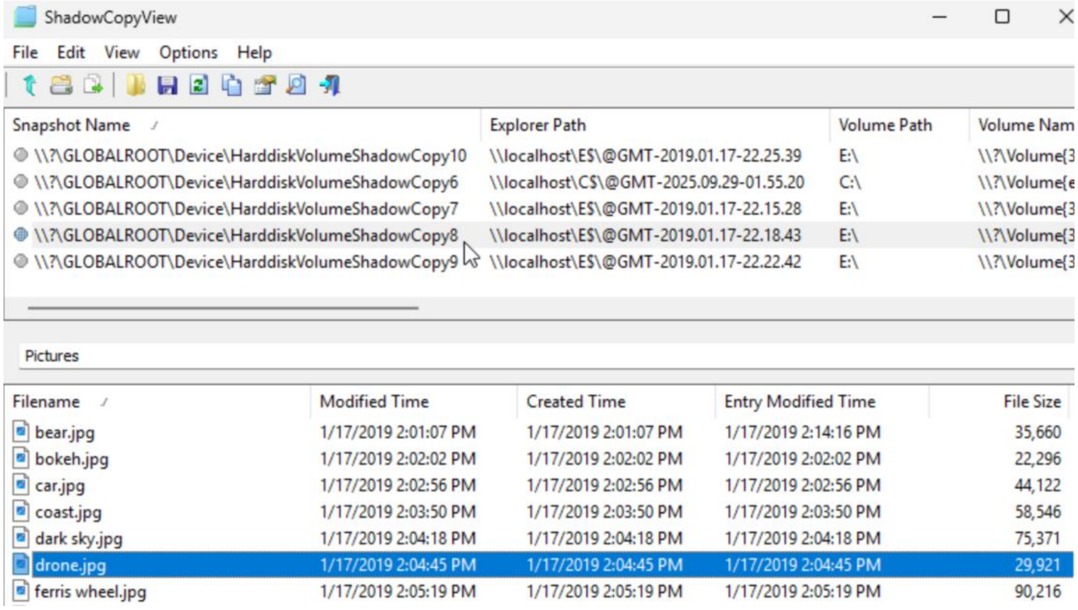
- **Supporting Evidence:**



Snapshot Name	Explorer Path	Volume Path	Volume Nam
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy10	\\localhost\E$\@GMT-2019.01.17-22.25.39	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy6	\\localhost\C$\@GMT-2025.09.29-01.55.20	C:\	\\?\Volume{e
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy7	\\localhost\E$\@GMT-2019.01.17-22.15.28	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy8	\\localhost\E$\@GMT-2019.01.17-22.18.43	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy9	\\localhost\E$\@GMT-2019.01.17-22.22.42	E:\	\\?\Volume{3

Filename	Modified Time	Created Time	Entry Modified Time	File Size
bear.jpg	1/17/2019 2:01:07 PM	1/17/2019 2:01:07 PM	1/17/2019 2:14:16 PM	35,660
bokeh.jpg	1/17/2019 2:02:02 PM	1/17/2019 2:02:02 PM	1/17/2019 2:02:02 PM	22,296
car.jpg	1/17/2019 2:02:56 PM	1/17/2019 2:02:56 PM	1/17/2019 2:02:56 PM	44,122
coast.jpg	1/17/2019 2:03:50 PM	1/17/2019 2:03:50 PM	1/17/2019 2:03:50 PM	58,546
dark sky.jpg	1/17/2019 2:04:18 PM	1/17/2019 2:04:18 PM	1/17/2019 2:04:18 PM	75,371
drone.jpg	1/17/2019 2:04:45 PM	1/17/2019 2:04:45 PM	1/17/2019 2:04:45 PM	29,921
ferris wheel.jpg	1/17/2019 2:05:19 PM	1/17/2019 2:05:19 PM	1/17/2019 2:05:19 PM	90,216

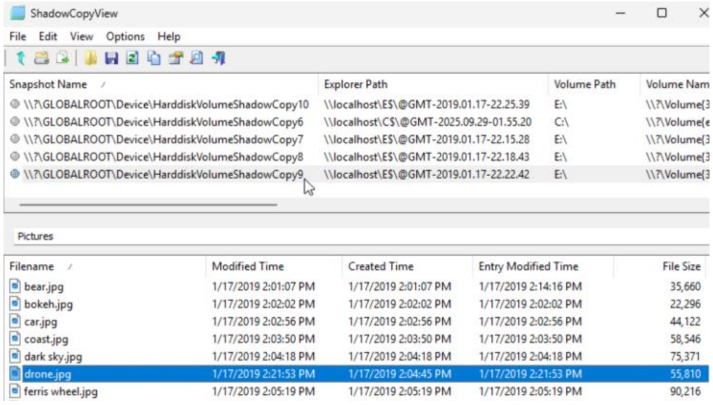
Figure 13. Metadata of drone.jpg in volume shadow copy v7 within ShadowCopyView



Snapshot Name	Explorer Path	Volume Path	Volume Nam
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy10	\\localhost\E$\@GMT-2019.01.17-22.25.39	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy6	\\localhost\C$\@GMT-2025.09.29-01.55.20	C:\	\\?\Volume{e
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy7	\\localhost\E$\@GMT-2019.01.17-22.15.28	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy8	\\localhost\E$\@GMT-2019.01.17-22.18.43	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy9	\\localhost\E$\@GMT-2019.01.17-22.22.42	E:\	\\?\Volume{3

Filename	Modified Time	Created Time	Entry Modified Time	File Size
bear.jpg	1/17/2019 2:01:07 PM	1/17/2019 2:01:07 PM	1/17/2019 2:14:16 PM	35,660
bokeh.jpg	1/17/2019 2:02:02 PM	1/17/2019 2:02:02 PM	1/17/2019 2:02:02 PM	22,296
car.jpg	1/17/2019 2:02:56 PM	1/17/2019 2:02:56 PM	1/17/2019 2:02:56 PM	44,122
coast.jpg	1/17/2019 2:03:50 PM	1/17/2019 2:03:50 PM	1/17/2019 2:03:50 PM	58,546
dark sky.jpg	1/17/2019 2:04:18 PM	1/17/2019 2:04:18 PM	1/17/2019 2:04:18 PM	75,371
drone.jpg	1/17/2019 2:04:45 PM	1/17/2019 2:04:45 PM	1/17/2019 2:04:45 PM	29,921
ferris wheel.jpg	1/17/2019 2:05:19 PM	1/17/2019 2:05:19 PM	1/17/2019 2:05:19 PM	90,216

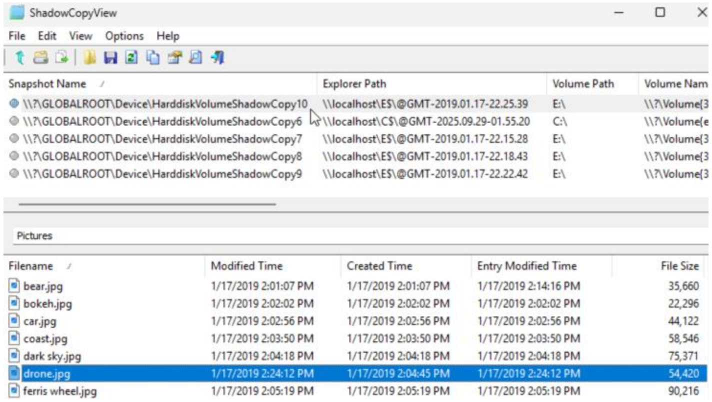
Figure 14. Metadata of drone.jpg in volume shadow copy v8 within ShadowCopyView



Snapshot Name	Explorer Path	Volume Path	Volume Nam
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy10	\\localhost\E$\@GMT-2019.01.17-22.25.39	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy6	\\localhost\C$\@GMT-2025.09.29-01.55.20	C:\	\\?\Volume{e
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy7	\\localhost\E$\@GMT-2019.01.17-22.15.28	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy8	\\localhost\E$\@GMT-2019.01.17-22.18.43	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy9	\\localhost\E$\@GMT-2019.01.17-22.22.42	E:\	\\?\Volume{3

Filename	Modified Time	Created Time	Entry Modified Time	File Size
bear.jpg	1/17/2019 2:01:07 PM	1/17/2019 2:01:07 PM	1/17/2019 2:14:16 PM	35,660
bokeh.jpg	1/17/2019 2:02:02 PM	1/17/2019 2:02:02 PM	1/17/2019 2:02:02 PM	22,296
car.jpg	1/17/2019 2:02:56 PM	1/17/2019 2:02:56 PM	1/17/2019 2:02:56 PM	44,122
coast.jpg	1/17/2019 2:03:50 PM	1/17/2019 2:03:50 PM	1/17/2019 2:03:50 PM	58,546
dark sky.jpg	1/17/2019 2:04:18 PM	1/17/2019 2:04:18 PM	1/17/2019 2:04:18 PM	75,371
drone.jpg	1/17/2019 2:21:53 PM	1/17/2019 2:04:45 PM	1/17/2019 2:21:53 PM	55,810
ferris wheel.jpg	1/17/2019 2:05:19 PM	1/17/2019 2:05:19 PM	1/17/2019 2:05:19 PM	90,216

Figure 15. Metadata of drone.jpg in volume shadow copy v9 within ShadowCopyView



Snapshot Name	Explorer Path	Volume Path	Volume Nam
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy10	\\localhost\E$\@GMT-2019.01.17-22.25.39	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy6	\\localhost\C$\@GMT-2025.09.29-01.55.20	C:\	\\?\Volume{e
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy7	\\localhost\E$\@GMT-2019.01.17-22.15.28	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy8	\\localhost\E$\@GMT-2019.01.17-22.18.43	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy9	\\localhost\E$\@GMT-2019.01.17-22.22.42	E:\	\\?\Volume{3

Filename	Modified Time	Created Time	Entry Modified Time	File Size
bear.jpg	1/17/2019 2:01:07 PM	1/17/2019 2:01:07 PM	1/17/2019 2:14:16 PM	35,660
bokeh.jpg	1/17/2019 2:02:02 PM	1/17/2019 2:02:02 PM	1/17/2019 2:02:02 PM	22,296
car.jpg	1/17/2019 2:02:56 PM	1/17/2019 2:02:56 PM	1/17/2019 2:02:56 PM	44,122
coast.jpg	1/17/2019 2:03:50 PM	1/17/2019 2:03:50 PM	1/17/2019 2:03:50 PM	58,546
dark sky.jpg	1/17/2019 2:04:18 PM	1/17/2019 2:04:18 PM	1/17/2019 2:04:18 PM	75,371
drone.jpg	1/17/2019 2:24:12 PM	1/17/2019 2:04:45 PM	1/17/2019 2:24:12 PM	54,420
ferris wheel.jpg	1/17/2019 2:05:19 PM	1/17/2019 2:05:19 PM	1/17/2019 2:05:19 PM	90,216

Figure 16. Metadata of drone.jpg in volume shadow copy v10 within ShadowCopyView

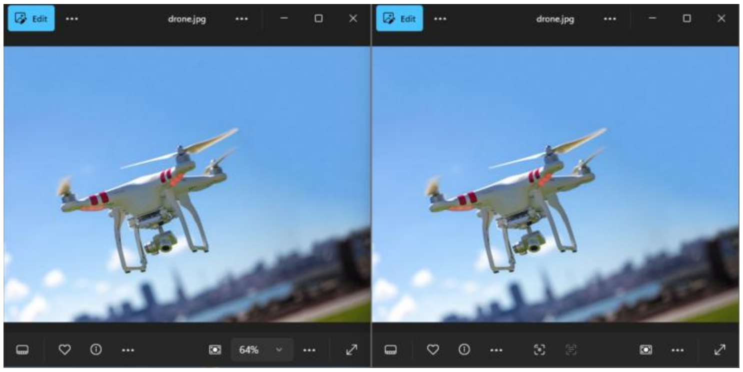
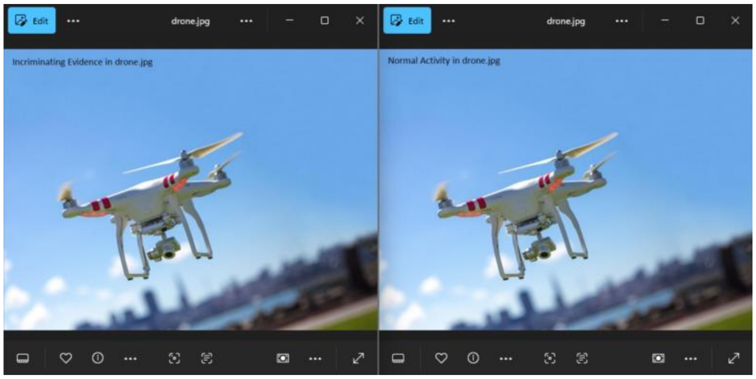


Figure 17. drone.jpg from volume shadow copy v7-8 accessed (showing no content change)



Incriminating Evidence in drone.jpg

Normal Activity in drone.jpg

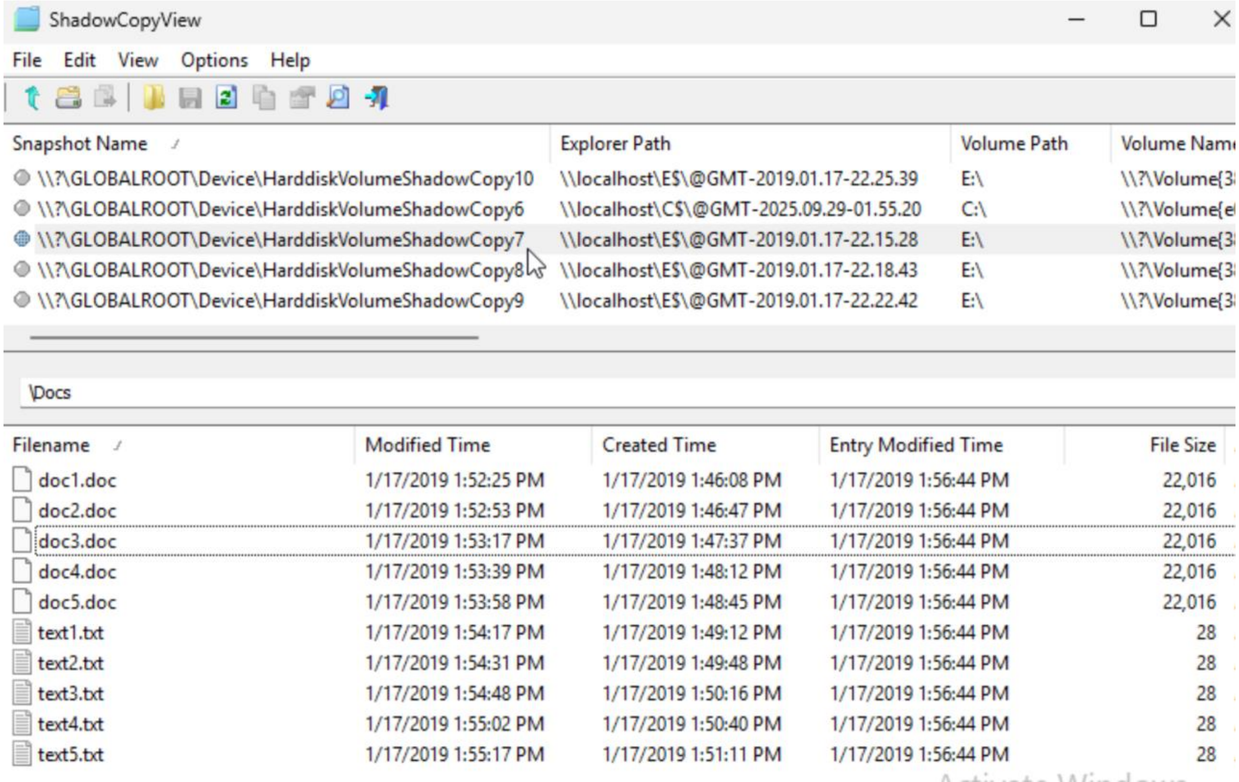
Figure 18. drone.jpg from volume shadow copy v9-10 accessed (showing content change)

4. What other file(s) in the Docs folder changed within five minutes of doc3.doc? How and when was it changed?

- **Analysis Performed:**
    - The volume shadow copies of "Windows 7 Shadow 20190117.vmdk" was analyzed through NirSoft's ShadowCopyView application.
    - The examiner analyzed the Modified Time, Created Time, and Entry Modified Time of all files. The original state of all files is shown in Figure 19. The modification of text4.txt is shown in Figure 20, and modification of text5.txt and doc2.doc is shown in Figure 21.
        - Original state
            - text4.txt within volume shadow copy v7:
                - Modified time is *01/17/2019 01:55:02 PM UTC*
                - Entry modified time is *01/17/2019 01:56:44 PM UTC*
            - text5.txt within volume shadow copy v7:
                - Modified time is *01/17/2019 01:55:17 PM UTC*
                - Entry modified time is *01/17/2019 01:56:44 PM UTC*
            - doc2.doc within volume shadow copy v7:
                - Modified time is *01/17/2019 01:52:53 PM UTC*
                - Entry modified time is *01/17/2019 01:56:44 PM UTC*
        - Changed state
            - text4.txt within volume shadow copy v8:
                - Modified time is *01/17/2019 02:16:31 PM UTC*
                - Entry modified time is *01/17/2019 02:16:31PM UTC*
            - text5.txt within volume shadow copy v9:
                - Modified time is *01/17/2019 02:20:15 PM UTC*
                - Entry modified time is *01/17/2019 02:20:15PM UTC*
            - doc2.doc within volume shadow copy v9:
                - Modified time is *01/17/2019 02:19:20 PM UTC*
                - Entry modified time is *01/17/2019 02:19:20PM UTC*
    - The examiner accessed text4.txt, text5.txt, and doc2.doc as shown in Figures 22-24.
        - The examiner accessed text4.txt file from volume shadow copy v7 and v8.
            - The content of text4.txt within volume shadow copy v7 is: "Normal Activity in text4.txt".
            - The content of text4.txt within volume shadow copy v8 is: "Change made to text4.txt".
        - The examiner accessed text5.txt file from volume shadow copy v7 and v9.
            - The content of text5.txt within volume shadow copy v7 is: "Normal Activity in text5.txt".
            - The content of text5.txt within volume shadow copy v9 is: "Change made to text5.txt".
        - The examiner accessed doc2.doc file in volume shadow copy v7 and v9.
            - The content of doc2.doc within volume shadow copy v7 is: "Normal Activity in doc2.doc".
            - The content of doc2.doc within volume shadow copy v9 is: "Change made to doc2.doc".
- **Answer:**

Within five minutes of the modification of doc3.doc, three other files in the Docs folder, text4.txt, text5.txt, and doc2.doc, were also changed. Specifically, *text4.txt* was modified on January 17, 2019, at 02:16:31 PM UTC, with its content altered from “Normal Activity in text4.txt” to “Change made to text4.txt” as shown in Figures 19, 20, and 22. Shortly afterward, *doc2.doc* was modified on January 17, 2019, at 02:19:20 PM UTC, changing from “Normal Activity in doc2.doc” to “Change made to doc2.doc” as shown in Figures 19, 21, and 24. Finally, *text5.txt* was modified on January 17, 2019, at 02:20:15 PM UTC, with its content updated from “Normal Activity in text5.txt” to “Change made to text5.txt” as shown in Figures 19, 21, and 23. These coordinated modifications, occurring within minutes of each other, indicate deliberate changes across multiple files in the Docs folder. **In conclusion, the evidence shows that text4.txt, text5.txt, and doc2.doc were intentionally altered in close proximity to the modification of doc3.doc.**

- **Supporting Evidence:**

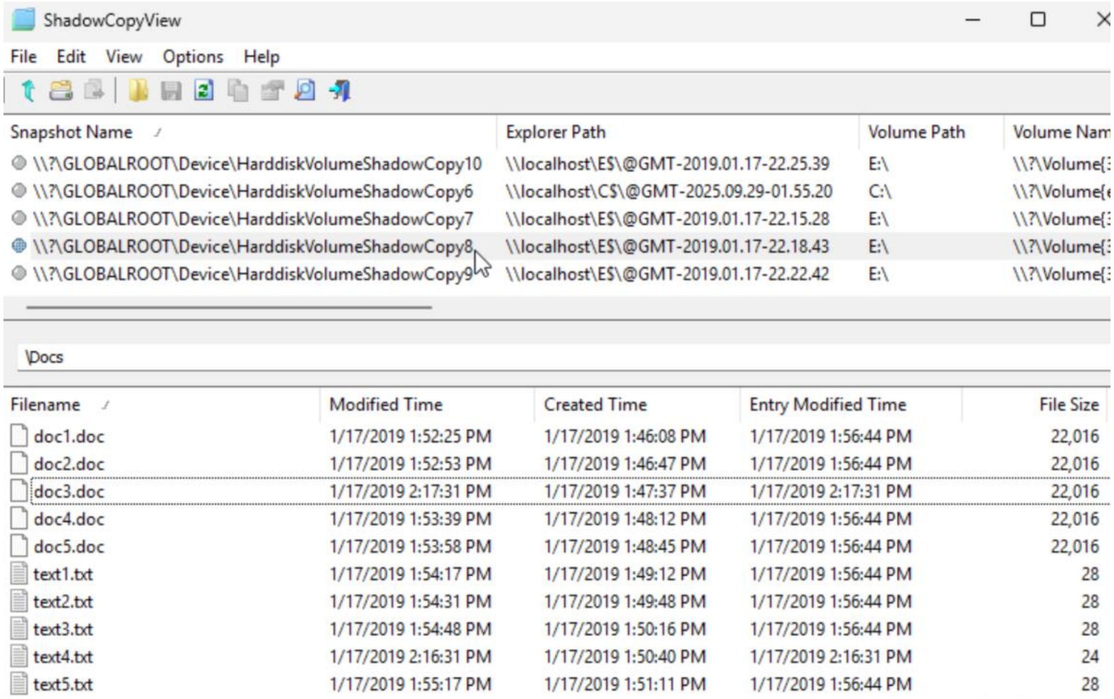


Snapshot Name	Explorer Path	Volume Path	Volume Nam
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy10	\\localhost\E$\@GMT-2019.01.17-22.25.39	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy6	\\localhost\C$\@GMT-2025.09.29-01.55.20	C:\	\\?\Volume{e
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy7	\\localhost\E$\@GMT-2019.01.17-22.15.28	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy8	\\localhost\E$\@GMT-2019.01.17-22.18.43	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy9	\\localhost\E$\@GMT-2019.01.17-22.22.42	E:\	\\?\Volume{3

\Docs

Filename	Modified Time	Created Time	Entry Modified Time	File Size
doc1.doc	1/17/2019 1:52:25 PM	1/17/2019 1:46:08 PM	1/17/2019 1:56:44 PM	22,016
doc2.doc	1/17/2019 1:52:53 PM	1/17/2019 1:46:47 PM	1/17/2019 1:56:44 PM	22,016
doc3.doc	1/17/2019 1:53:17 PM	1/17/2019 1:47:37 PM	1/17/2019 1:56:44 PM	22,016
doc4.doc	1/17/2019 1:53:39 PM	1/17/2019 1:48:12 PM	1/17/2019 1:56:44 PM	22,016
doc5.doc	1/17/2019 1:53:58 PM	1/17/2019 1:48:45 PM	1/17/2019 1:56:44 PM	22,016
text1.txt	1/17/2019 1:54:17 PM	1/17/2019 1:49:12 PM	1/17/2019 1:56:44 PM	28
text2.txt	1/17/2019 1:54:31 PM	1/17/2019 1:49:48 PM	1/17/2019 1:56:44 PM	28
text3.txt	1/17/2019 1:54:48 PM	1/17/2019 1:50:16 PM	1/17/2019 1:56:44 PM	28
text4.txt	1/17/2019 1:55:02 PM	1/17/2019 1:50:40 PM	1/17/2019 1:56:44 PM	28
text5.txt	1/17/2019 1:55:17 PM	1/17/2019 1:51:11 PM	1/17/2019 1:56:44 PM	28

Figure 19. Showing all the contents of the Docs folder within Volume Shadow Copy v7 (Original state of all files)

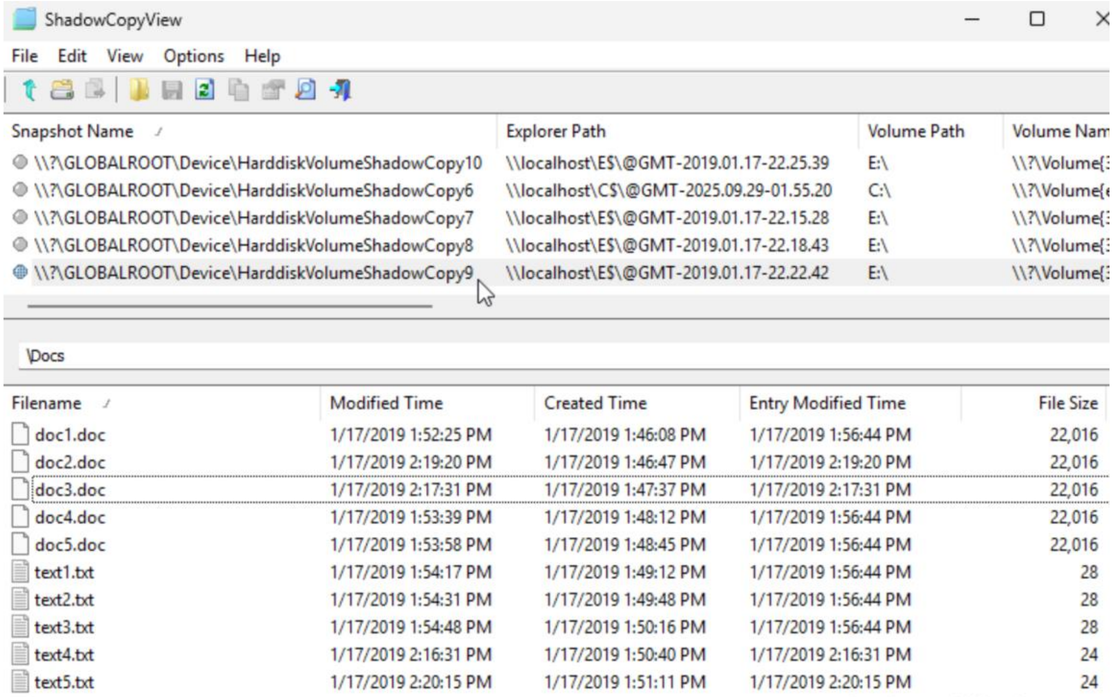


Snapshot Name	Explorer Path	Volume Path	Volume Nam
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy10	\\localhost\E$\@GMT-2019.01.17-22.25.39	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy6	\\localhost\C$\@GMT-2025.09.29-01.55.20	C:\	\\?\Volume{e
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy7	\\localhost\E$\@GMT-2019.01.17-22.15.28	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy8	\\localhost\E$\@GMT-2019.01.17-22.18.43	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy9	\\localhost\E$\@GMT-2019.01.17-22.22.42	E:\	\\?\Volume{3

\Docs

Filename	Modified Time	Created Time	Entry Modified Time	File Size
doc1.doc	1/17/2019 1:52:25 PM	1/17/2019 1:46:08 PM	1/17/2019 1:56:44 PM	22,016
doc2.doc	1/17/2019 1:52:53 PM	1/17/2019 1:46:47 PM	1/17/2019 1:56:44 PM	22,016
doc3.doc	1/17/2019 2:17:31 PM	1/17/2019 1:47:37 PM	1/17/2019 2:17:31 PM	22,016
doc4.doc	1/17/2019 1:53:39 PM	1/17/2019 1:48:12 PM	1/17/2019 1:56:44 PM	22,016
doc5.doc	1/17/2019 1:53:58 PM	1/17/2019 1:48:45 PM	1/17/2019 1:56:44 PM	22,016
text1.txt	1/17/2019 1:54:17 PM	1/17/2019 1:49:12 PM	1/17/2019 1:56:44 PM	28
text2.txt	1/17/2019 1:54:31 PM	1/17/2019 1:49:48 PM	1/17/2019 1:56:44 PM	28
text3.txt	1/17/2019 1:54:48 PM	1/17/2019 1:50:16 PM	1/17/2019 1:56:44 PM	28
text4.txt	1/17/2019 2:16:31 PM	1/17/2019 1:50:40 PM	1/17/2019 2:16:31 PM	24
text5.txt	1/17/2019 1:55:17 PM	1/17/2019 1:51:11 PM	1/17/2019 1:56:44 PM	28

Figure 20. Showing all the contents of the Docs folder within Volume Shadow Copy v8 (Text4.txt was modified)

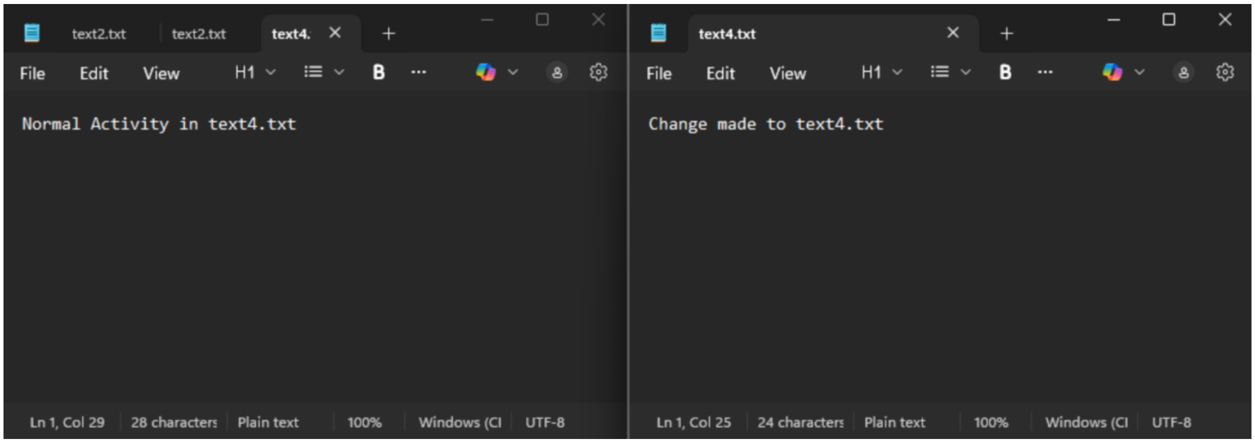


Snapshot Name	Explorer Path	Volume Path	Volume Nam
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy10	\\localhost\E$\@GMT-2019.01.17-22.25.39	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy6	\\localhost\C$\@GMT-2025.09.29-01.55.20	C:\	\\?\Volume{e
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy7	\\localhost\E$\@GMT-2019.01.17-22.15.28	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy8	\\localhost\E$\@GMT-2019.01.17-22.18.43	E:\	\\?\Volume{3
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy9	\\localhost\E$\@GMT-2019.01.17-22.22.42	E:\	\\?\Volume{3

\Docs

Filename	Modified Time	Created Time	Entry Modified Time	File Size
doc1.doc	1/17/2019 1:52:25 PM	1/17/2019 1:46:08 PM	1/17/2019 1:56:44 PM	22,016
doc2.doc	1/17/2019 2:19:20 PM	1/17/2019 1:46:47 PM	1/17/2019 2:19:20 PM	22,016
doc3.doc	1/17/2019 2:17:31 PM	1/17/2019 1:47:37 PM	1/17/2019 2:17:31 PM	22,016
doc4.doc	1/17/2019 1:53:39 PM	1/17/2019 1:48:12 PM	1/17/2019 1:56:44 PM	22,016
doc5.doc	1/17/2019 1:53:58 PM	1/17/2019 1:48:45 PM	1/17/2019 1:56:44 PM	22,016
text1.txt	1/17/2019 1:54:17 PM	1/17/2019 1:49:12 PM	1/17/2019 1:56:44 PM	28
text2.txt	1/17/2019 1:54:31 PM	1/17/2019 1:49:48 PM	1/17/2019 1:56:44 PM	28
text3.txt	1/17/2019 1:54:48 PM	1/17/2019 1:50:16 PM	1/17/2019 1:56:44 PM	28
text4.txt	1/17/2019 2:16:31 PM	1/17/2019 1:50:40 PM	1/17/2019 2:16:31 PM	24
text5.txt	1/17/2019 2:20:15 PM	1/17/2019 1:51:11 PM	1/17/2019 2:20:15 PM	24

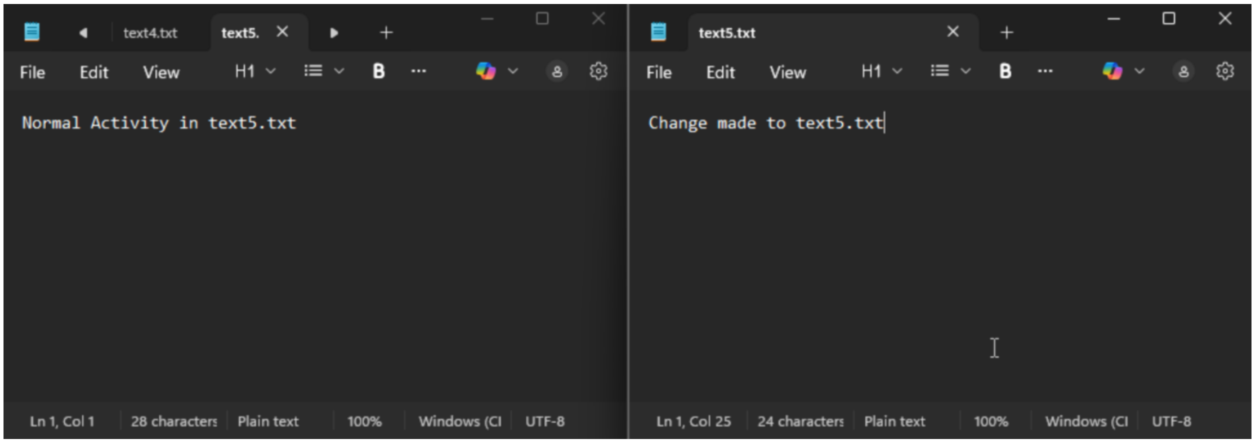
Figure 21. Showing all the contents of the Docs folder within Volume Shadow Copy v8 (Text5.txt and doc2.doc was modified)



```
Normal Activity in text4.txt
```

```
Change made to text4.txt
```

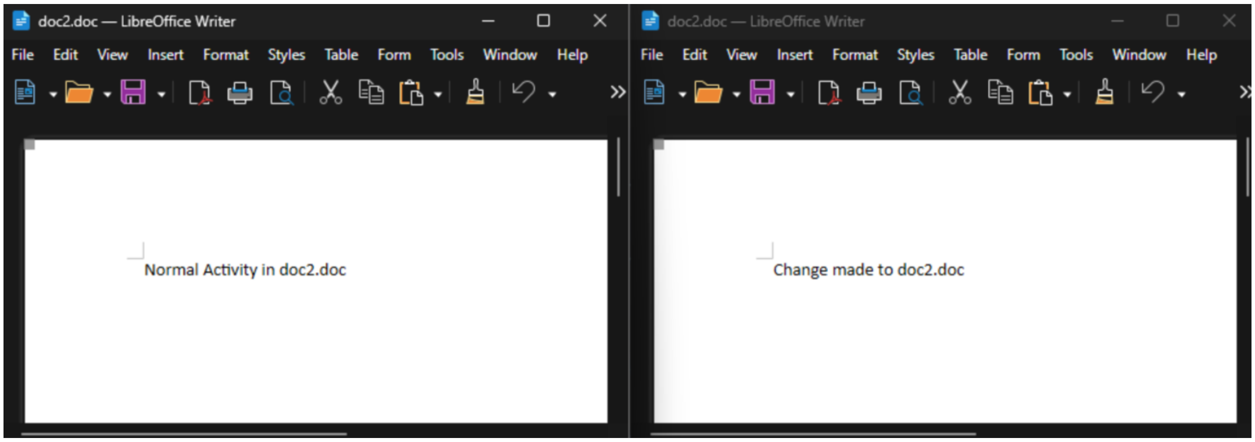
Figure 22. Showing the contents of text4.txt in volume shadow copy v7 and v8 (content was changed)



```
Normal Activity in text5.txt
```

```
Change made to text5.txt
```

Figure 23. Showing the contents of text5.txt in volume shadow copy v7 and v9 (content was changed)



Normal Activity in doc2.doc

Change made to doc2.doc

Figure 24. Showing the contents of doc2.doc in volume shadow copy v7 and v9 (content was changed)

5. Using a hex editor, find the MFT entry for \Docs\text2.txt in the oldest VSC difference file. Provide a screen print of the sector containing the file content. Describe and explain what you see, relative to the NTFS file system.

- **Analysis Performed:**
  - The examiner mounted "Windows 7 Shadow 20190117.vmdk" in FTK Imager and then opened the E: drive (mounted drive) in WinHex, as shown in Figure 25.
  - The examiner then found the oldest volume shadow copy difference file, as shown highlighted in Figure 26, and opened it within WinHex for further analysis.
  - The examiner then located the MFT entry of text2.txt, spanning offsets 0x00D8B000 to 0x00D8B3F0, as shown in Figure 27.
    - The $DATA attribute, beginning at offset 0x00D8B148, spans 700-bytes, ending at 0x00D8B3F0
      - This is because $DATA is usually 700 bytes and starting from offset 0x00D8B148, with a 700-byte length, the ending offset is 0x00D8B3F0
    - The file content is: "Normal Activity in text2.txt".
  - Within the $DATA attribute header, at offset 0x00D8B154, a 4-byte little-endian value (1C 00 00 00) indicates that the file content length is 28 bytes.
  - As shown in Figure 28, when accessed via the NTFS file system in Windows 11 Notepad, the file content of text2.txt is: "Normal Activity in text2.txt".
- **Answer:**
  The file content of text2.txt within the oldest volume shadow copy difference file is consistent across both the hex editor (MFT entry) and the NTFS file system. The content is: "Normal Activity in text2.txt." As shown in Figure 27, additional strings appear in the MFT entry that are not visible when the file is opened in the NTFS file system. These extra bytes are likely leftover slack space or metadata stored in the unused portion of the MFT record. The NTFS file system uses the Value Length field (at offset 0x00D8B154, showing "1C 00 00 00" = 28 in little-endian) to determine that the file has exactly 28 bytes of valid content. Therefore, only the string "Normal Activity in text2.txt" is displayed. **In conclusion, the hex editor view may reveal slack space or metadata beyond the logical content, but the NTFS file system correctly limits the file to its declared 28-byte length.**

- **Supporting Evidence:**

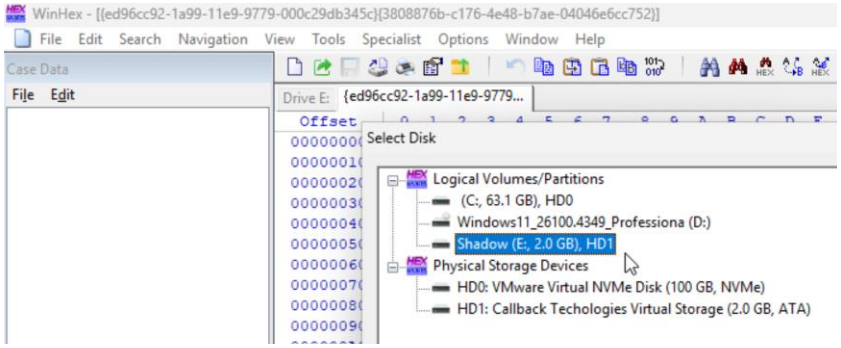
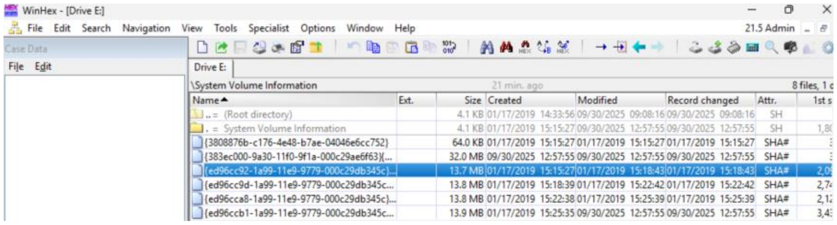
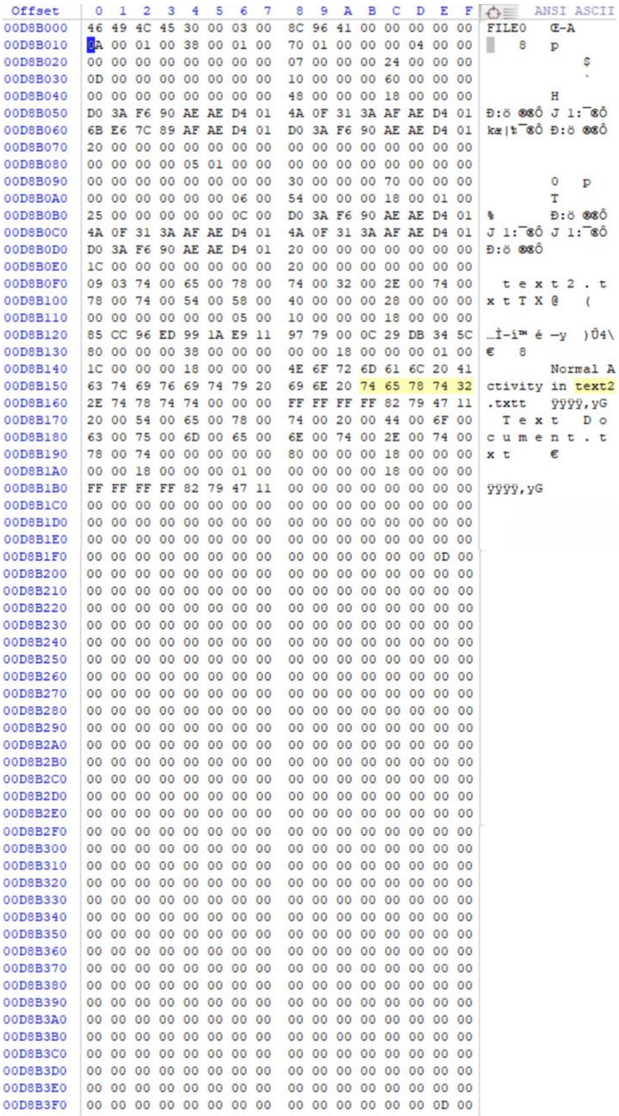

WinHex - [{ed96cc92-1a99-11e9-9779-000c29db345c}{3808876b-c176-4e48-b7ae-04046e6cc752}]
File
Edit
Search
Navigation
View
Tools
Specialist
Options
Window
Help
Case Data
File
Edit
Drive E:
{ed96cc92-1a99-11e9-9779...
Offset
00000000
00000010
00000020
00000030
00000040
00000050
00000060
00000070
00000080
00000090
Select Disk
Logical Volumes/Partitions
(C:, 63.1 GB), HD0
Windows11_26100.4349_Professiona (D:)
Shadow (E:, 2.0 GB), HD1
Physical Storage Devices
HD0: VMware Virtual NVMe Disk (100 GB, NVMe)
HD1: Callback Techologies Virtual Storage (2.0 GB, ATA)

Figure 25. Opening the E: drive disk ("Windows 7 Shadow 20190117.vmdk") in WinHex


WinHex - [Drive E:]
File Edit Search Navigation View Tools Specialist Options Window Help
21.5 Admin
Case Data
File Edit
Drive E:

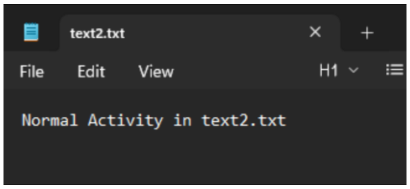
```
\System Volume Information                      21 min. ago                                               8 files, 1 c
Name ▲                                     Ext.     Size Created             Modified            Record changed      Attr.  1st s
.. = (Root directory)                             4.1 KB 01/17/2019 14:33:56 09/30/2025 09:08:16 09/30/2025 09:08:16 SH
. = System Volume Information                     4.1 KB 01/17/2019 15:15:27 09/30/2025 12:57:55 09/30/2025 12:57:55 SH     1,8(
{3808876b-c176-4e48-b7ae-04046e6cc752}           64.0 KB 01/17/2019 15:15:27 01/17/2019 15:15:27 01/17/2019 15:15:27 SHA#
{383ec000-9a30-11f0-9f1a-000c29ae6f63}{...       32.0 MB 09/30/2025 12:57:55 09/30/2025 12:57:55 09/30/2025 12:57:55 SHA#
{ed96cc92-1a99-11e9-9779-000c29db345c}...        13.7 MB 01/17/2019 15:15:27 01/17/2019 15:18:43 01/17/2019 15:18:43 SHA#   2,0
{ed96cc9d-1a99-11e9-9779-000c29db345c...         13.8 MB 01/17/2019 15:18:39 01/17/2019 15:22:42 01/17/2019 15:22:42 SHA#   2,7
{ed96cca8-1a99-11e9-9779-000c29db345c}...        13.8 MB 01/17/2019 15:22:38 01/17/2019 15:25:39 01/17/2019 15:25:39 SHA#   2,1
{ed96ccb1-1a99-11e9-9779-000c29db345c...         13.9 MB 01/17/2019 15:25:35 09/30/2025 12:57:55 09/30/2025 12:57:55 SHA#   3,4
```

Figure 26. Finding the oldest volume shadow copy difference file within the mounted E: drive ("Windows 7 Shadow 20190117.vmdk") and opening it



```
  Offset    0  1  2  3  4  5  6  7   8  9  A  B  C  D  E  F   ANSI ASCII
00D8B000   46 49 4C 45 30 00 03 00  8C 96 41 00 00 00 00 00   FILE0   Œ–A
00D8B010   0A 00 01 00 38 00 01 00  70 01 00 00 00 04 00 00       8   p
00D8B020   00 00 00 00 00 00 00 00  07 00 00 00 24 00 00 00             $
00D8B030   0D 00 00 00 00 00 00 00  10 00 00 00 60 00 00 00             `
00D8B040   00 00 00 00 00 00 00 00  48 00 00 00 18 00 00 00           H
00D8B050   D0 3A F6 90 AE AE D4 01  4A 0F 31 3A AF AE D4 01   Ð:ö ®®Ô J 1:¯®Ô
00D8B060   6B E6 7C 89 AF AE D4 01  D0 3A F6 90 AE AE D4 01   kæ|‰¯®Ô Ð:ö ®®Ô
00D8B070   20 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B080   00 00 00 00 05 01 00 00  00 00 00 00 00 00 00 00
00D8B090   00 00 00 00 00 00 00 00  30 00 00 00 70 00 00 00           0   p
00D8B0A0   00 00 00 00 00 00 06 00  54 00 00 00 18 00 01 00           T
00D8B0B0   25 00 00 00 00 00 0C 00  D0 3A F6 90 AE AE D4 01   %       Ð:ö ®®Ô
00D8B0C0   4A 0F 31 3A AF AE D4 01  4A 0F 31 3A AF AE D4 01   J 1:¯®Ô J 1:¯®Ô
00D8B0D0   D0 3A F6 90 AE AE D4 01  20 00 00 00 00 00 00 00   Ð:ö ®®Ô
00D8B0E0   1C 00 00 00 00 00 00 00  20 00 00 00 00 00 00 00
00D8B0F0   09 03 74 00 65 00 78 00  74 00 32 00 2E 00 74 00     t e x t 2 . t
00D8B100   78 00 74 00 54 00 58 00  40 00 00 00 28 00 00 00   x t T X @   (
00D8B110   00 00 00 00 00 00 05 00  10 00 00 00 18 00 00 00
00D8B120   85 CC 96 ED 99 1A E9 11  97 79 00 0C 29 DB 34 5C   …Ì–í™ é —y  )Û4\
00D8B130   80 00 00 00 38 00 00 00  00 00 18 00 00 00 01 00   €   8
00D8B140   1C 00 00 00 18 00 00 00  4E 6F 72 6D 61 6C 20 41           Normal A
00D8B150   63 74 69 76 69 74 79 20  69 6E 20 74 65 78 74 32   ctivity in text2
00D8B160   2E 74 78 74 74 00 00 00  FF FF FF FF 82 79 47 11   .txtt   ÿÿÿÿ‚yG
00D8B170   20 00 54 00 65 00 78 00  74 00 20 00 44 00 6F 00     T e x t   D o
00D8B180   63 00 75 00 6D 00 65 00  6E 00 74 00 2E 00 74 00   c u m e n t . t
00D8B190   78 00 74 00 00 00 00 00  80 00 00 00 18 00 00 00   x t     €
00D8B1A0   00 00 18 00 00 00 01 00  00 00 00 00 18 00 00 00
00D8B1B0   FF FF FF FF 82 79 47 11  00 00 00 00 00 00 00 00   ÿÿÿÿ‚yG
00D8B1C0   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B1D0   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B1E0   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B1F0   00 00 00 00 00 00 00 00  00 00 00 00 00 00 0D 00
00D8B200   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B210   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B220   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B230   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B240   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B250   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B260   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B270   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B280   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B290   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B2A0   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B2B0   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B2C0   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B2D0   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B2E0   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B2F0   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B300   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B310   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B320   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B330   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B340   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B350   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B360   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B370   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B380   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B390   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B3A0   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B3B0   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B3C0   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B3D0   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B3E0   00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
00D8B3F0   00 00 00 00 00 00 00 00  00 00 00 00 00 00 0D 00
```

Figure 27. Full MFT entry of text2.txt within the oldest volume shadow copy difference file (1024 bytes in length, from offset 00D8B000 to 00D8B3F0)



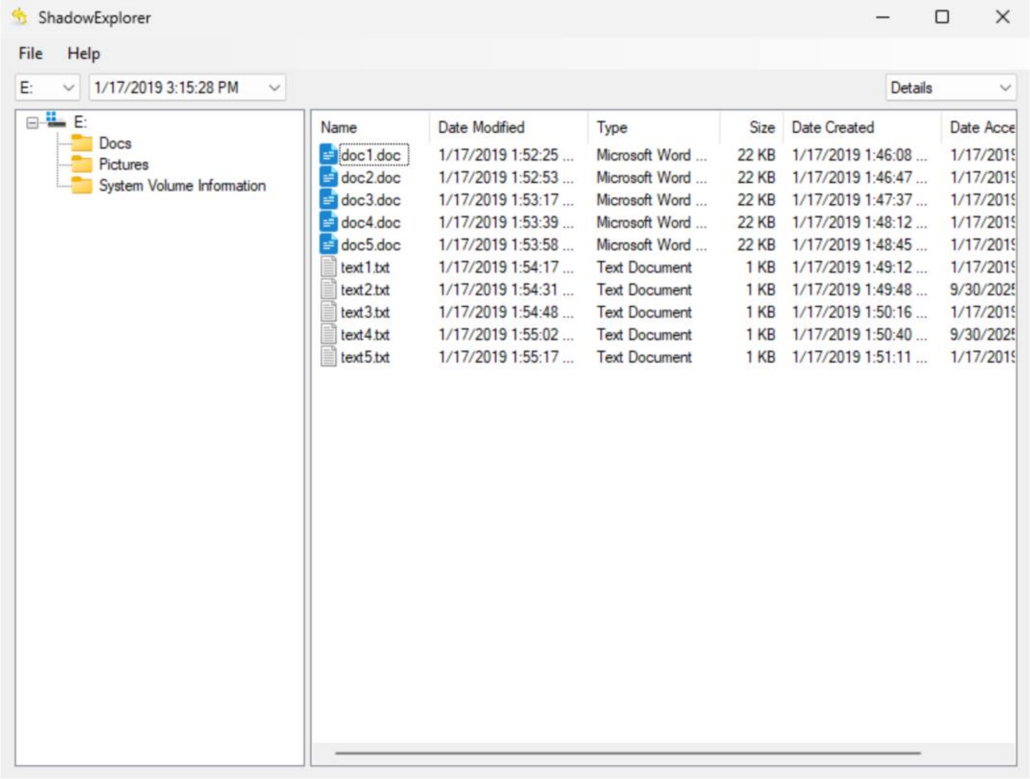
```
Normal Activity in text2.txt
```

Figure 28. Accessed contents of text2.txt in NTFS filesystem via Windows 11 Notepad

6. Compare (what's similar?) and contrast (what's different) with regard to the data and metadata parsed by ShadowExplorer (shadowexplorer.com), ShadowCopyView (NirSoft.net), and VSSadmin (native, built-in Windows command line utility).

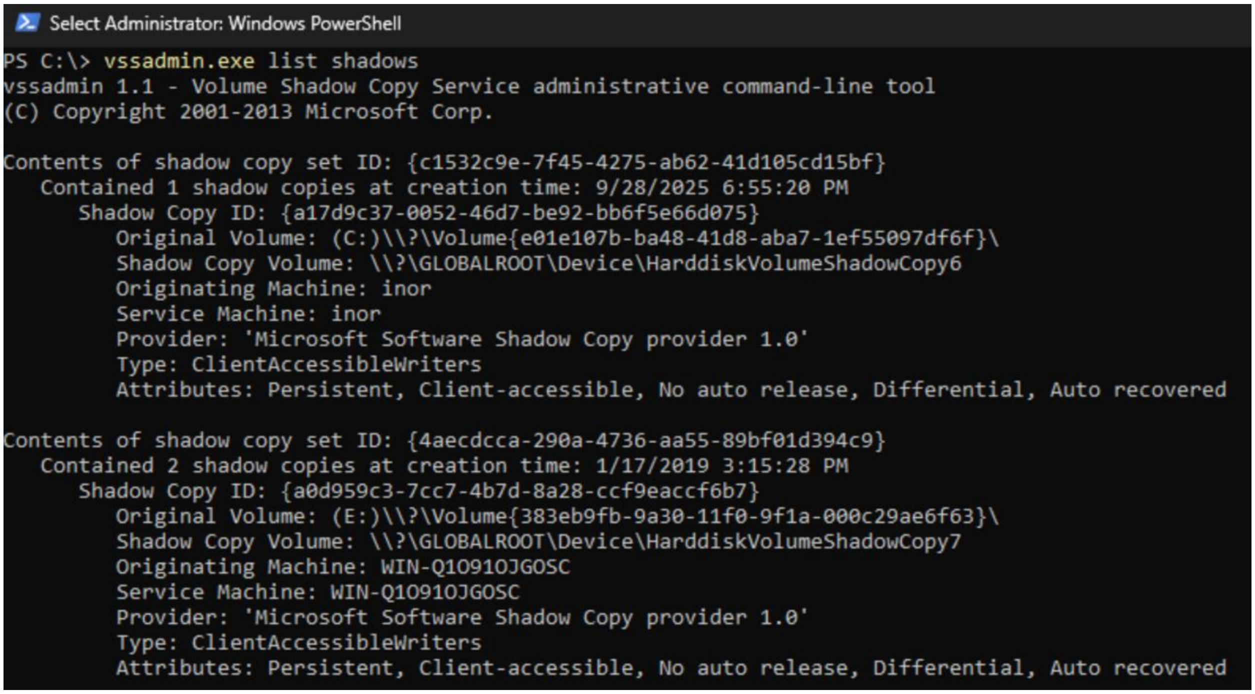
- **Analysis Performed:**
    - It is important for cybersecurity professionals to cross-reference findings with multiple tools, as each may present limitations or omit certain details.
    - The examiner analyzed the data and metadata of the oldest volume shadow copy difference file parsed by ShadowExplorer, VSSadmin, and ShadowCopyView, as shown in Figures 29-31.
        - ShadowExplorer
            - Provides a graphical interface to browse the NTFS file system within a shadow copy. It allows file access and export but does not display shadow copy metadata.
        - VSSadmin
            - A native Windows command-line utility that lists shadow copies and their metadata (creation times, volume associations, storage usage). It does not display the NTFS file system or allow file export.
        - ShadowCopyView
            - Offers both NTFS file system browsing and shadow copy metadata. Like ShadowExplorer, it supports file access/export, but it also includes metadata details similar to VSSadmin.
- **Answer:**
  ShadowExplorer, VSSadmin, and ShadowCopyView each provide different perspectives on volume shadow copies, and understanding their strengths and limitations is critical in forensic work. ShadowExplorer offers a graphical interface that allows users to browse the NTFS file system and export files from a shadow copy. However, it does not display metadata, which limits its usefulness for timeline and context analysis. VSSadmin, by contrast, is a command-line utility that provides metadata such as creation times, volume associations, and storage usage, but it does not allow file system browsing or file export. ShadowCopyView combines both functions, enabling browsing and exporting of files from the NTFS file system while also presenting metadata similar to VSSadmin. It is important for cybersecurity professionals to examine each tool available to them to determine which tools are most effective for the specific task at hand. Some investigations may require metadata-focused analysis, where VSSadmin provides quick and reliable results, while others may demand file-level access for recovery, where ShadowExplorer or ShadowCopyView would be more suitable. ShadowCopyView is the most comprehensive of the three, offering both metadata and file content access, but corroborating findings with multiple tools ensures accuracy and completeness. **In conclusion, ShadowExplorer and ShadowCopyView are similar in enabling file recovery, but only ShadowCopyView provides metadata visibility, whereas VSSadmin remains limited to metadata reporting.** From a forensic perspective, cross-tool validation is essential, as using multiple utilities reduces the risk of overlooking critical evidence and strengthens the reliability of investigative findings.

- **Supporting Evidence:**



Name	Date Modified	Type	Size	Date Created	Date Acce
doc1.doc	1/17/2019 1:52:25 ...	Microsoft Word ...	22 KB	1/17/2019 1:46:08 ...	1/17/201
doc2.doc	1/17/2019 1:52:53 ...	Microsoft Word ...	22 KB	1/17/2019 1:46:47 ...	1/17/201
doc3.doc	1/17/2019 1:53:17 ...	Microsoft Word ...	22 KB	1/17/2019 1:47:37 ...	1/17/201
doc4.doc	1/17/2019 1:53:39 ...	Microsoft Word ...	22 KB	1/17/2019 1:48:12 ...	1/17/201
doc5.doc	1/17/2019 1:53:58 ...	Microsoft Word ...	22 KB	1/17/2019 1:48:45 ...	1/17/201
text1.txt	1/17/2019 1:54:17 ...	Text Document	1 KB	1/17/2019 1:49:12 ...	1/17/201
text2.txt	1/17/2019 1:54:31 ...	Text Document	1 KB	1/17/2019 1:49:48 ...	9/30/202
text3.txt	1/17/2019 1:54:48 ...	Text Document	1 KB	1/17/2019 1:50:16 ...	1/17/201
text4.txt	1/17/2019 1:55:02 ...	Text Document	1 KB	1/17/2019 1:50:40 ...	9/30/202
text5.txt	1/17/2019 1:55:17 ...	Text Document	1 KB	1/17/2019 1:51:11 ...	1/17/201

Figure 29. ShadowExplorer parsing data from volume shadow copy

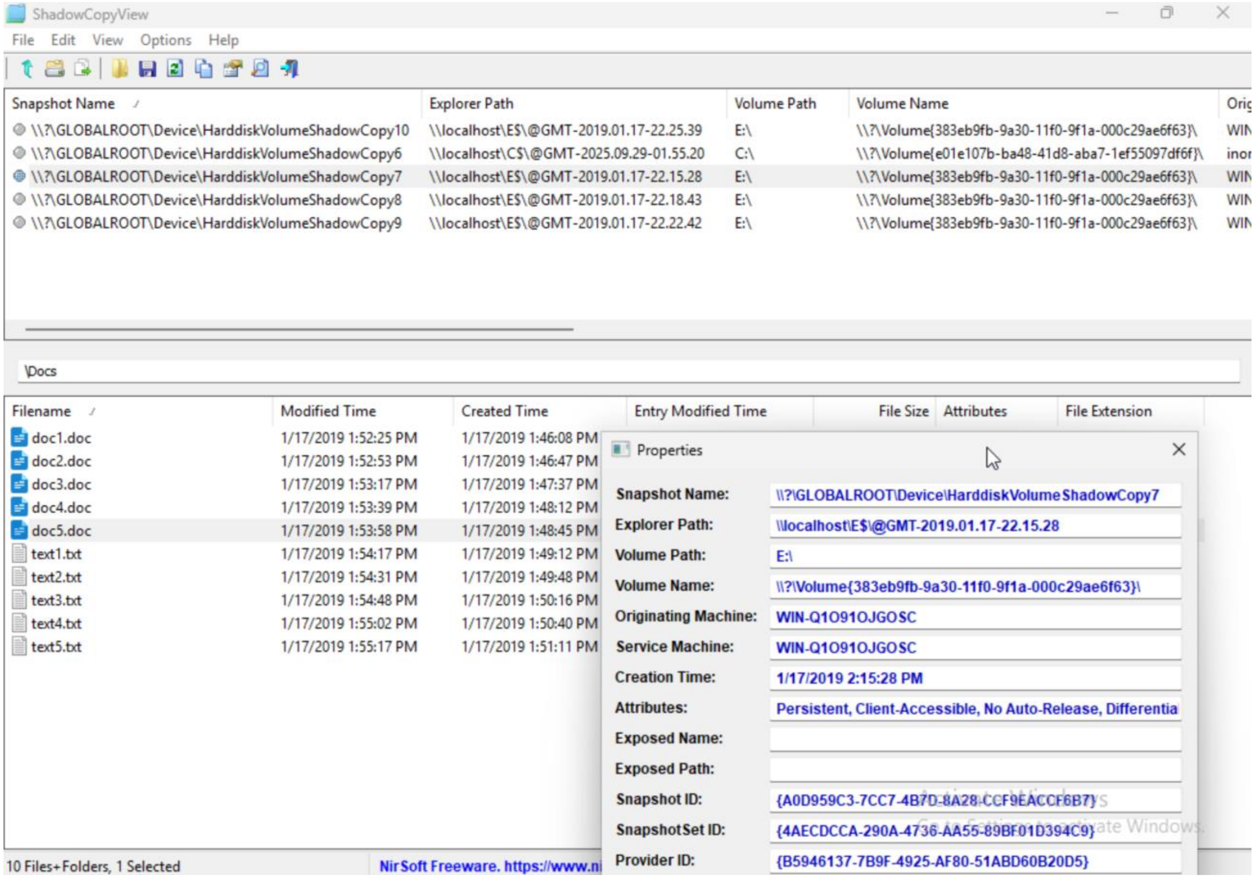


```
PS C:\> vssadmin.exe list shadows
vssadmin 1.1 - Volume Shadow Copy Service administrative command-line tool
(C) Copyright 2001-2013 Microsoft Corp.

Contents of shadow copy set ID: {c1532c9e-7f45-4275-ab62-41d105cd15bf}
   Contained 1 shadow copies at creation time: 9/28/2025 6:55:20 PM
      Shadow Copy ID: {a17d9c37-0052-46d7-be92-bb6f5e66d075}
         Original Volume: (C:)\\?\Volume{e01e107b-ba48-41d8-aba7-1ef55097df6f}\
         Shadow Copy Volume: \\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy6
         Originating Machine: inor
         Service Machine: inor
         Provider: 'Microsoft Software Shadow Copy provider 1.0'
         Type: ClientAccessibleWriters
         Attributes: Persistent, Client-accessible, No auto release, Differential, Auto recovered

Contents of shadow copy set ID: {4aecdcca-290a-4736-aa55-89bf01d394c9}
   Contained 2 shadow copies at creation time: 1/17/2019 3:15:28 PM
      Shadow Copy ID: {a0d959c3-7cc7-4b7d-8a28-ccf9eaccf6b7}
         Original Volume: (E:)\\?\Volume{383eb9fb-9a30-11f0-9f1a-000c29ae6f63}\
         Shadow Copy Volume: \\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy7
         Originating Machine: WIN-Q1O91OJGOSC
         Service Machine: WIN-Q1O91OJGOSC
         Provider: 'Microsoft Software Shadow Copy provider 1.0'
         Type: ClientAccessibleWriters
         Attributes: Persistent, Client-accessible, No auto release, Differential, Auto recovered
```

Figure 30. VSSadmin parsing metadata from volume shadow copy



Snapshot Name	Explorer Path	Volume Path	Volume Name	Orig
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy10	\\localhost\E$\@GMT-2019.01.17-22.25.39	E:\	\\?\Volume{383eb9fb-9a30-11f0-9f1a-000c29ae6f63}\	WIN
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy6	\\localhost\C$\@GMT-2025.09.29-01.55.20	C:\	\\?\Volume{e01e107b-ba48-41d8-aba7-1ef55097df6f}\	inor
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy7	\\localhost\E$\@GMT-2019.01.17-22.15.28	E:\	\\?\Volume{383eb9fb-9a30-11f0-9f1a-000c29ae6f63}\	WIN
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy8	\\localhost\E$\@GMT-2019.01.17-22.18.43	E:\	\\?\Volume{383eb9fb-9a30-11f0-9f1a-000c29ae6f63}\	WIN
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy9	\\localhost\E$\@GMT-2019.01.17-22.22.42	E:\	\\?\Volume{383eb9fb-9a30-11f0-9f1a-000c29ae6f63}\	WIN

\Docs

Filename	Modified Time	Created Time	Entry Modified Time	File Size	Attributes	File Extension
doc1.doc	1/17/2019 1:52:25 PM	1/17/2019 1:46:08 PM				
doc2.doc	1/17/2019 1:52:53 PM	1/17/2019 1:46:47 PM				
doc3.doc	1/17/2019 1:53:17 PM	1/17/2019 1:47:37 PM				
doc4.doc	1/17/2019 1:53:39 PM	1/17/2019 1:48:12 PM				
doc5.doc	1/17/2019 1:53:58 PM	1/17/2019 1:48:45 PM				
text1.txt	1/17/2019 1:54:17 PM	1/17/2019 1:49:12 PM				
text2.txt	1/17/2019 1:54:31 PM	1/17/2019 1:49:48 PM				
text3.txt	1/17/2019 1:54:48 PM	1/17/2019 1:50:16 PM				
text4.txt	1/17/2019 1:55:02 PM	1/17/2019 1:50:40 PM				
text5.txt	1/17/2019 1:55:17 PM	1/17/2019 1:51:11 PM				

10 Files+Folders, 1 Selected

NirSoft Freeware. https://www.ni

Properties

Snapshot Name:	\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy7
Explorer Path:	\\localhost\E$\@GMT-2019.01.17-22.15.28
Volume Path:	E:\
Volume Name:	\\?\Volume{383eb9fb-9a30-11f0-9f1a-000c29ae6f63}\
Originating Machine:	WIN-Q1O91OJGOSC
Service Machine:	WIN-Q1O91OJGOSC
Creation Time:	1/17/2019 2:15:28 PM
Attributes:	Persistent, Client-Accessible, No Auto-Release, Differentia
Exposed Name:	
Exposed Path:	
Snapshot ID:	{A0D959C3-7CC7-4B7D-8A28-CCF9EACCF6B7}
SnapshotSet ID:	{4AECDCCA-290A-4736-AA55-89BF01D394C9}
Provider ID:	{B5946137-7B9F-4925-AF80-51ABD60B20D5}

Figure 31. ShadowCopyView parsing metadata and data from volume shadow copy

Conclusion

The examiner, Inor Wang, enjoyed this lab! There is no critique from me. Thank you.

References

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