

User Behavior Analysis:

- User Behavior
- UserAssist
- RecentDocs
- ShellBags

User Behavior

- UserAssist – applications opened
- RecentDocs – files and folders opened
- Shellbags – locations browsed by the user
- Open / Save MRU – files that were opened
- Last-Visited MRU – applications used to open files

UserAssist

NTUSER.DAT\Software\Microsoft\Windows\CurrentVersion\Explorer\UserAssist\

- {CEBFF5CD-ACE2-4F4F-9178-9926F41749EA} - List of applications, files, links, and another objects that have been accessed.
- {F4E57C4B-2036-45F0-A9AB-443BCFE33D9F} - Lists the shortcut links used to start programs.
- Drag and drop the NTUSER.DAT registry hive in Registry Explorer, then move to Available Bookmarks.
- You can use Registry Explorer or the text file NTUSER.DAT.txt for information, either option is good.

Forensics-System (Ubuntu Subsystem + Forensic Tools Installed) [Running] - Oracle VM VirtualBox

Registry Explorer v1.6.0.0

File Tools Options Bookmarks (4/0) View Help

Registry hives (6) Available bookmarks (103/0)

Enter text to search... Find

Key name	# values	# subkeys	Last write timestamp
C:\Cases\E\Windows\System32\config\SEC...	=	=	=
ROOT	0	3	2023-02-14 03:11:26
C:\Cases\E\Windows\System32\config\DEF...			
ROOT	0	8	2023-02-13 17:22:44
Unassociated deleted values	302	0	
C:\Cases\E\Windows\System32\config\SAM			
ROOT	0	1	2018-04-25 15:46:33
Unassociated deleted values	1	0	
C:\Cases\E\Windows\System32\config\SY...			
ROOT	0	16	2023-02-14 03:11:05
Associated deleted records	0	0	
Unassociated deleted values	523	0	
C:\Cases\E\Windows\System32\config\S0...			
ROOT	0	16	2018-04-25 15:59:49
Associated deleted records	0	0	
Unassociated deleted records	0	0	
Unassociated deleted values	29	0	
C:\Cases\Analysis\Registry\NTUSER.DAT			
ROOT	0	9	2023-02-13 17:11:34
Associated deleted records	0	0	
Unassociated deleted values	1	0	

Values

Drag a column header here to group by that column

Value Name	Value Type	Data	Value Slack	Is Deleted	Data Record Reallocated
Version	RegDword	5		<input type="checkbox"/>	<input type="checkbox"/>

Type viewer Binary viewer

Value name: Version

Value type: RegDword

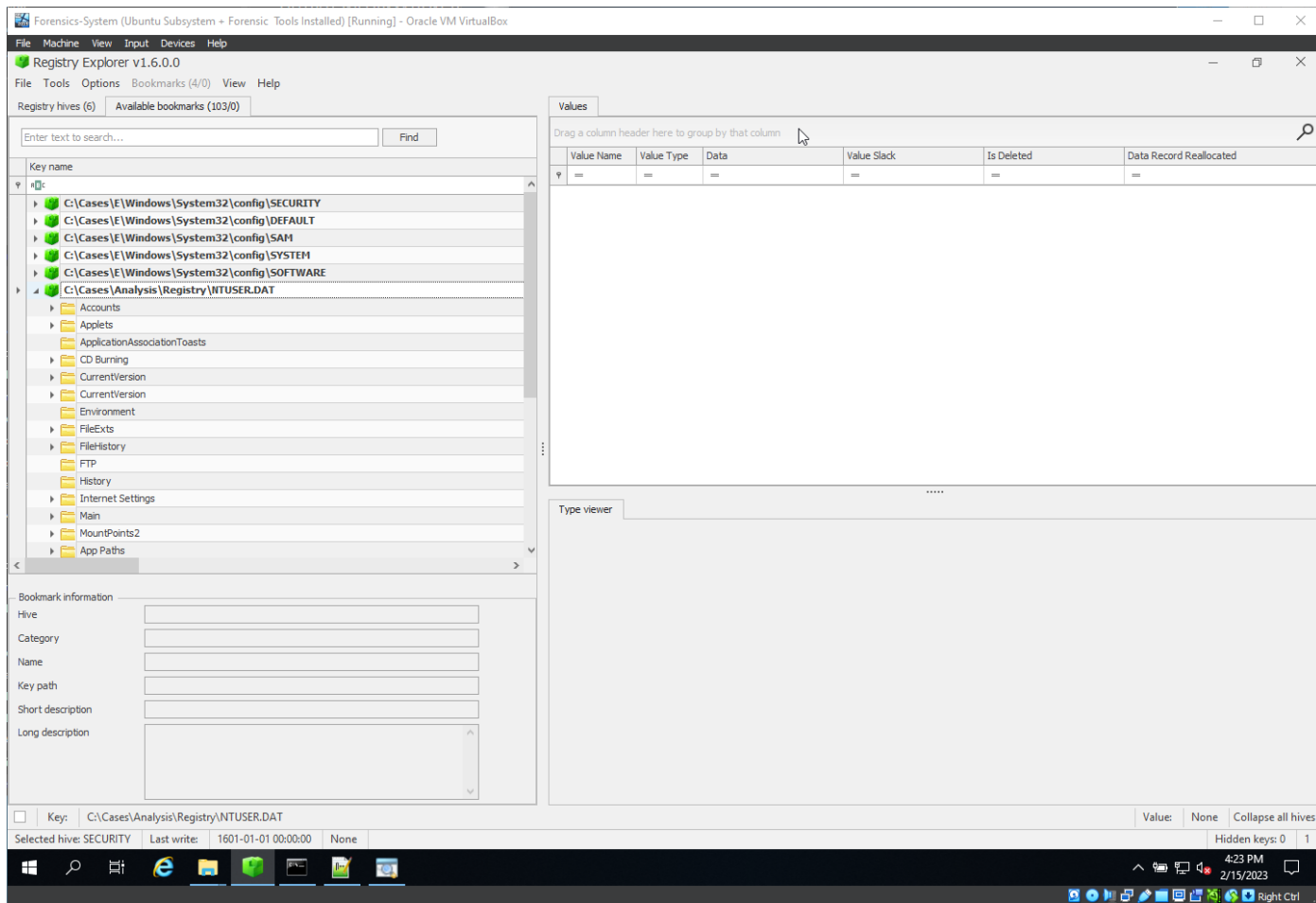
Value: 5

Raw value: 05-00-00-00

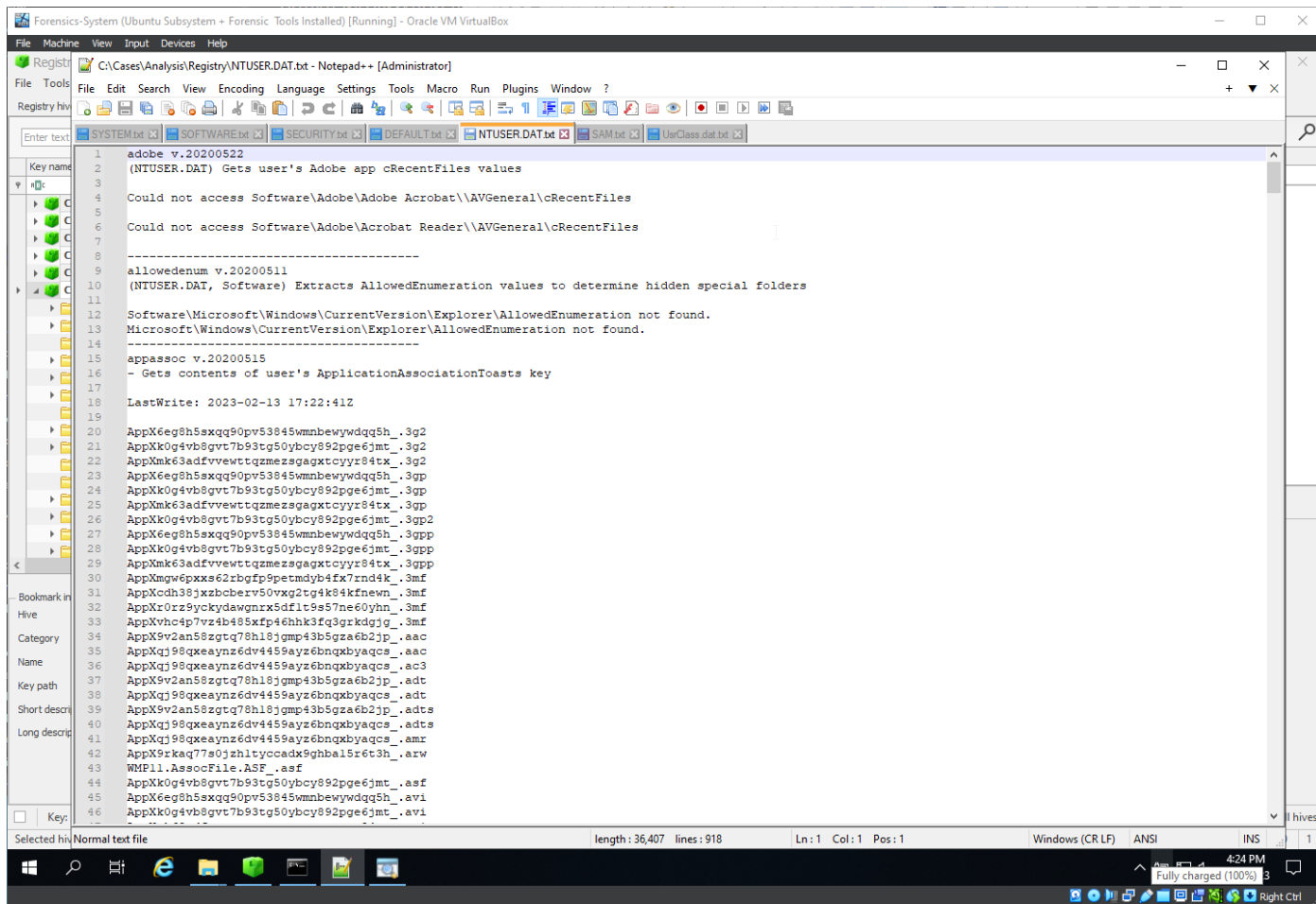
Key: Software\Microsoft\Windows\CurrentVersion\Explorer\UserAssist\F4E57C4B-2036-45F0-A9AB-443BCFE33D9F

Selected hive: SECURITY Last write: 4/25/2018 3:48:28 PM +00:00 1 of 1 values shown (100.00%) Copied Key path to clipboard Hidden keys: 0 1

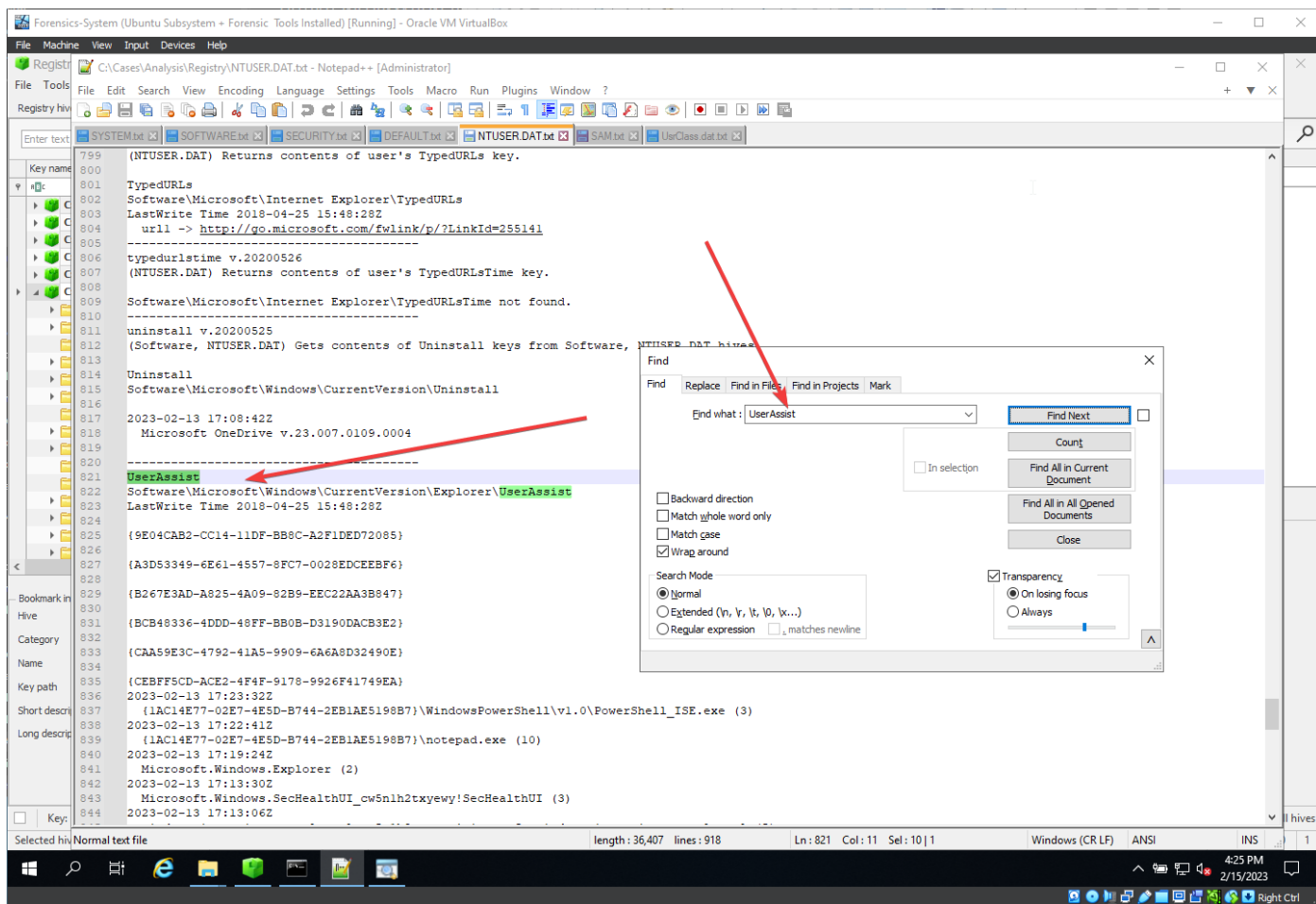
4:22 PM 2/15/2023



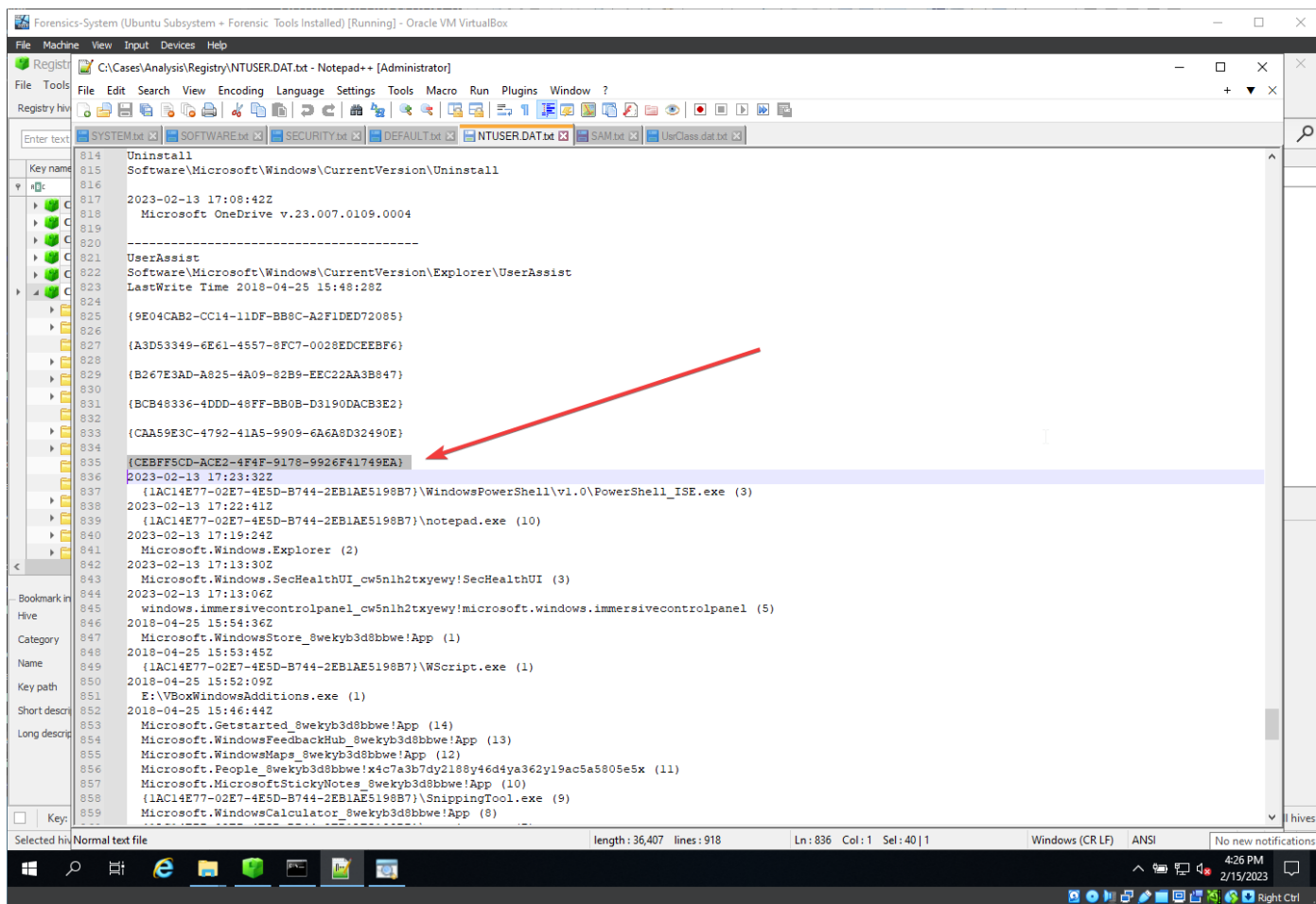
- NTUSER.DAT.txt:



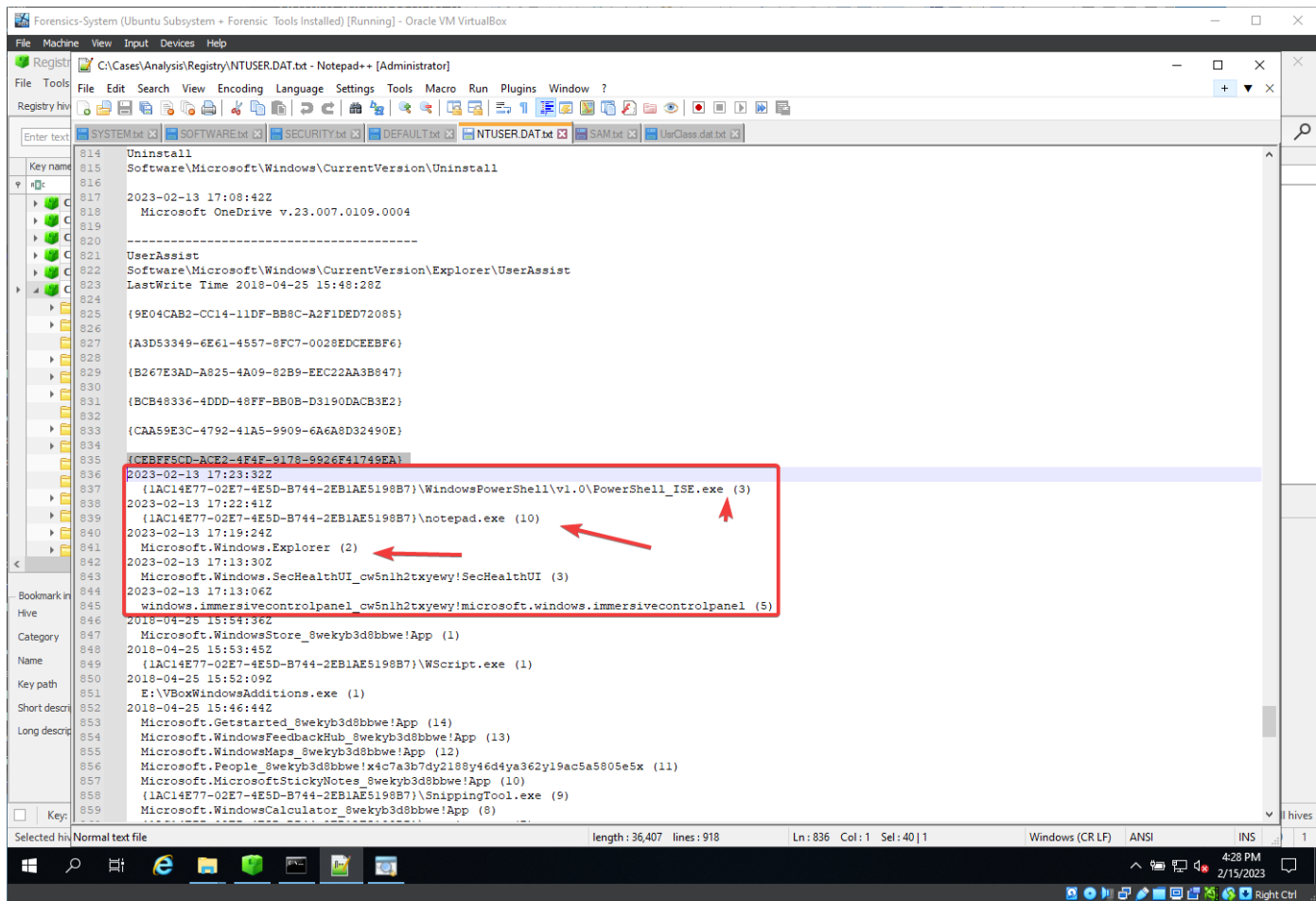
- Search for UserAssist:

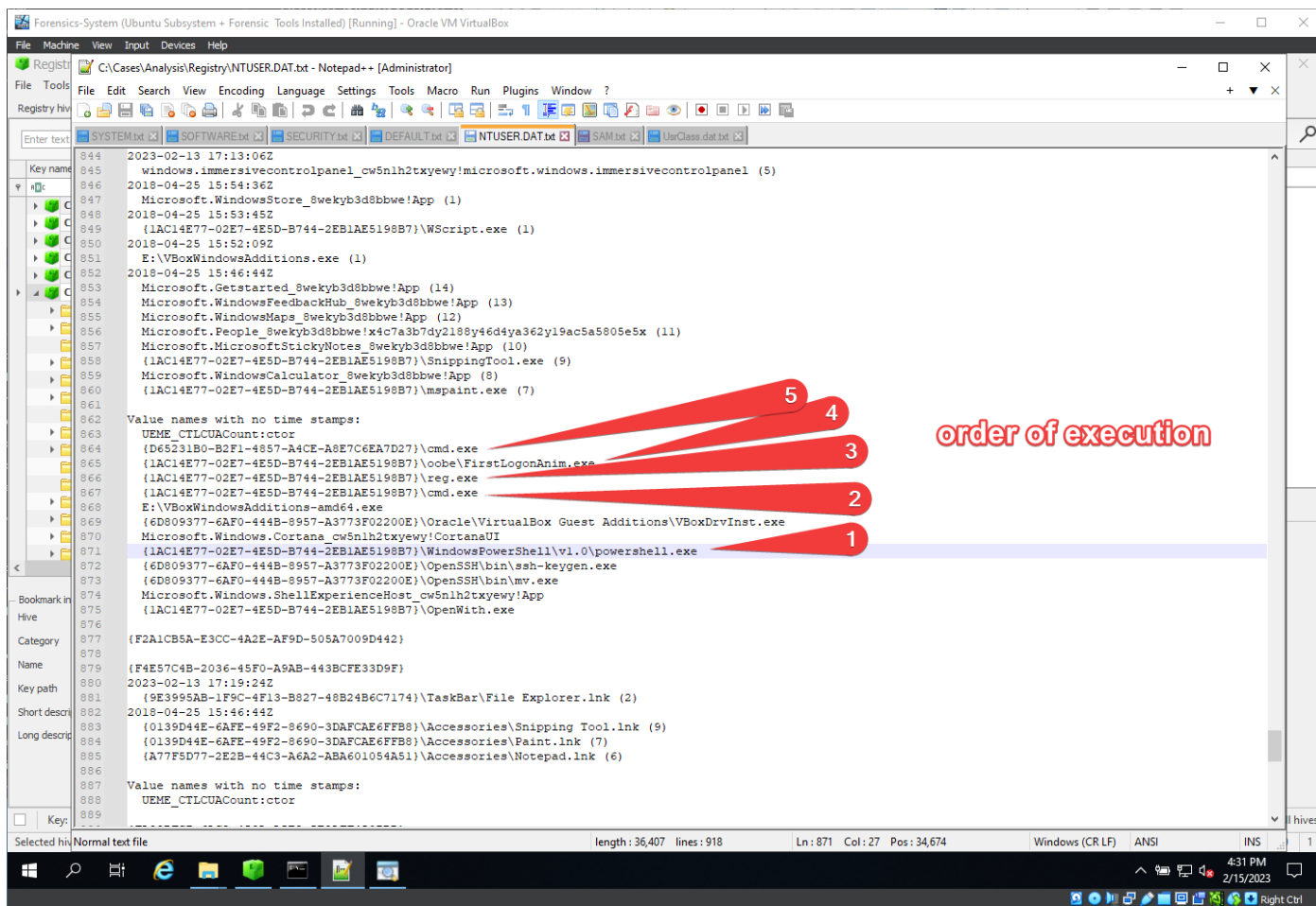


- Search for the particular subkey we want to see for the investigation:

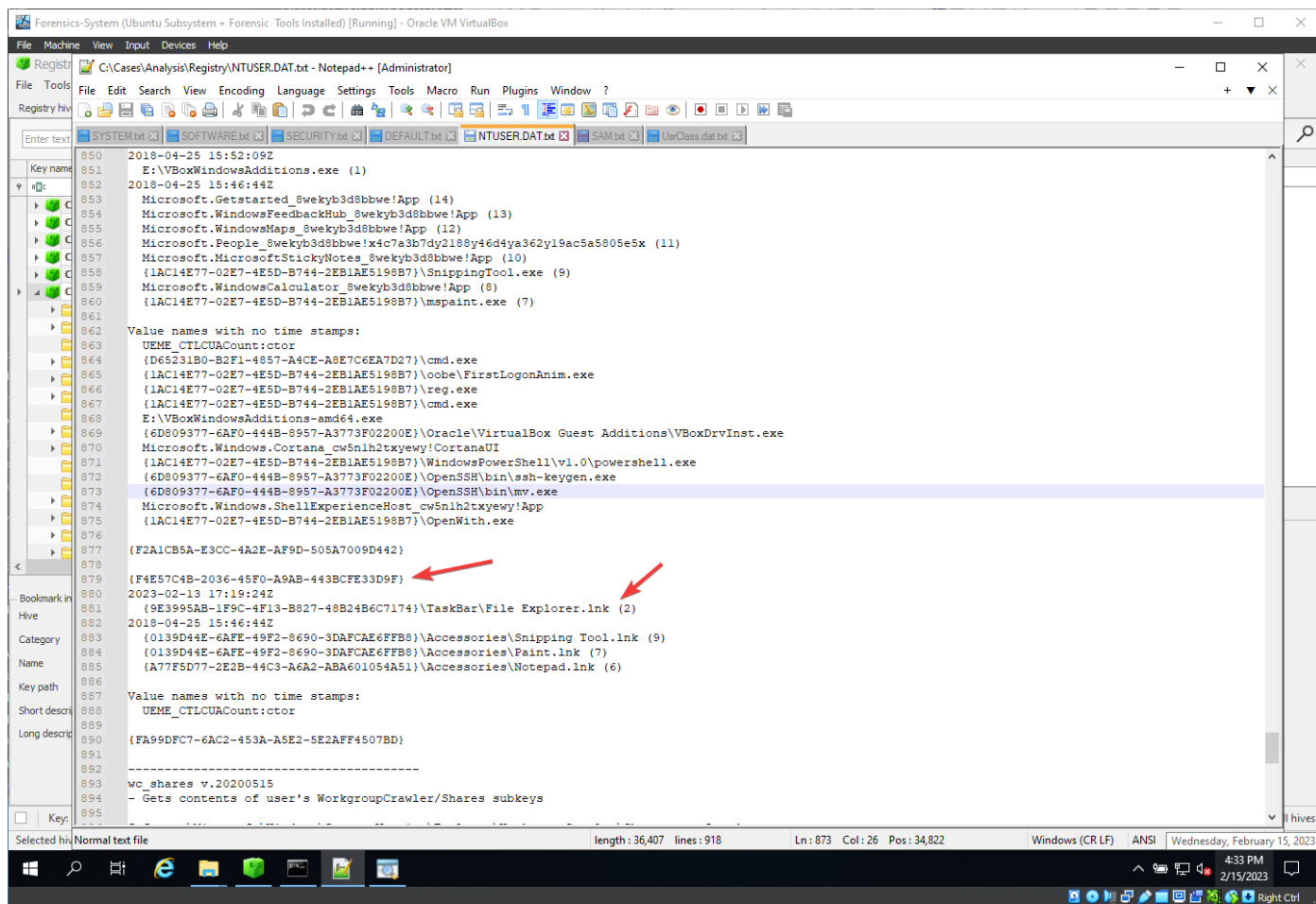


- We need to search for interesting executables accessed in the timeline we want to see:





- Search for the particular subkey we want to see for the investigation:



RecentDocs

- Can be found at:
 - o NTUSER.DAT\Software\Microsoft\Windows\CurrentVersion\Explorer\RecentDocs

Forensics-System (Ubuntu Subsystem + Forensic Tools Installed) [Running] - Oracle VM VirtualBox

Registry Explorer v1.6.0.0

File Tools Options Bookmarks (4/0) View Help

Registry hives (6) Available bookmarks (103/0)

Enter text to search... Find

Key name

Key: Software\Microsoft\Windows\CurrentVersion\Explorer\RecentDocs

Bookmark information

Hive: Category: Name: Key path: Short description: Long description:

Values

Extension	Value Name	Target Name	Lnk Name	Min Position	Opened On	Extension Last Opened
RecentDocs	11	AtomicRedTeam	AtomicRedTeam.lnk	0	2023-02-13 17:23:33	2023-02-13 17:23:33
RecentDocs	12	ART-attack-cleanup.ps1	ART-attack-cleanup.ps1.lnk	1	2023-02-13 17:23:33	2023-02-13 17:23:33
RecentDocs	10	ART-attack.ps1	ART-attack.ps1.lnk	2		
RecentDocs	9	Install-Sysmon	Install-Sysmon.lnk	3		
RecentDocs	8	Install-Sysmon.ps1	Install-Sysmon.ps1.lnk	4		
RecentDocs	5	The Internet	The Internet.lnk	5		
RecentDocs	7	threat/	windowsdefender--threat--lnk	6		
RecentDocs	6	windowsdefender:///	windowsdefender---lnk	7		
RecentDocs	4	pdp?ProductId=9WZDNCRFH4ZDT&ocid=QF	ms-windows-storepdp?ProductId=9WZDNCRFH4ZDT&ocid=QF.lnk	8		
RecentDocs	3	CD Drive (E:)	CD Drive (2).lnk	9		

Total rows: 23

Type viewer Slack viewer

```

00000000 00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F 10 11 12 13 14 15
00000016 08 00 00 00 0C 00 00 00 0A 00 00 00 09 00 00 00 08 00 00 05 00
0000002C 02 00 00 00 01 00 00 00 FF FF FF FF

```

Current offset: 0 (0x0) Bytes selected: 0 (0x0)

Data interpreter: ?

Value: MRUListEx Collapse all hives

No new notifications

4:35 PM 2/15/2023

- You can see applications that has been accessed above.
- Application extensions used:

Forensics-System (Ubuntu Subsystem + Forensic Tools Installed) [Running] - Oracle VM VirtualBox

Registry Explorer v1.6.0.0

File Tools Options Bookmarks (4/0) View Help

Registry hives (6) Available bookmarks (103/0)

Enter text to search... Find

Key name

- Desktop
- Discardable
- ExtractionWizard
- FileExts
- HideDesktopIcons
- LogonStats
- LowRegistry
- MenuOrder
- Modules
- MountPoints2
- Package Installation
- RecentDocs**
- .ps1
- .vbs
- .xml
- Folder
- RestartCommands
- Ribbon
- RunMRU
- SearchPlatform
- Shell Folders

Bookmark information

Hive:

Category:

Name:

Key path:

Short description:

Long description:

Values Recent documents

Drag a column header here to group by that column

Extension	Value Name	Target Name	Lnk Name	Mru Position	Opened On	Extension Last Opened
RecentDocs	11	AtomicRedTeam	AtomicRedTeam.lnk	0	2023-02-13 17:23:33	2023-02-13 17:23:33
RecentDocs	12	ART-attack-cleanup.ps1	ART-attack-cleanup.ps1.lnk	1		2023-02-13 17:23:33
RecentDocs	10	ART-attack.ps1	ART-attack.ps1.lnk	2		
RecentDocs	9	Install-Sysmon	Install-Sysmon.lnk	3		
RecentDocs	8	Install-Sysmon.ps1	Install-Sysmon.ps1.lnk	4		
RecentDocs	5	The Internet	The Internet.lnk	5		
RecentDocs	7	threat/	windowsdefender--threat-.lnk	6		
RecentDocs	6	windowsdefender:///	windowsdefender---.lnk	7		
RecentDocs	4	pdp?ProductId=9WZDNCRFHZDT8ocd=QF	ms-windows-storepdp?ProductId=9WZDNCRFHZDT8ocd=QF.lnk	8		
RecentDocs	3	CD Drive (E:)	CD Drive (2).lnk	9		

Total rows: 23

Type viewer Slack viewer

00000000 00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F 10 11 12 13 14 15

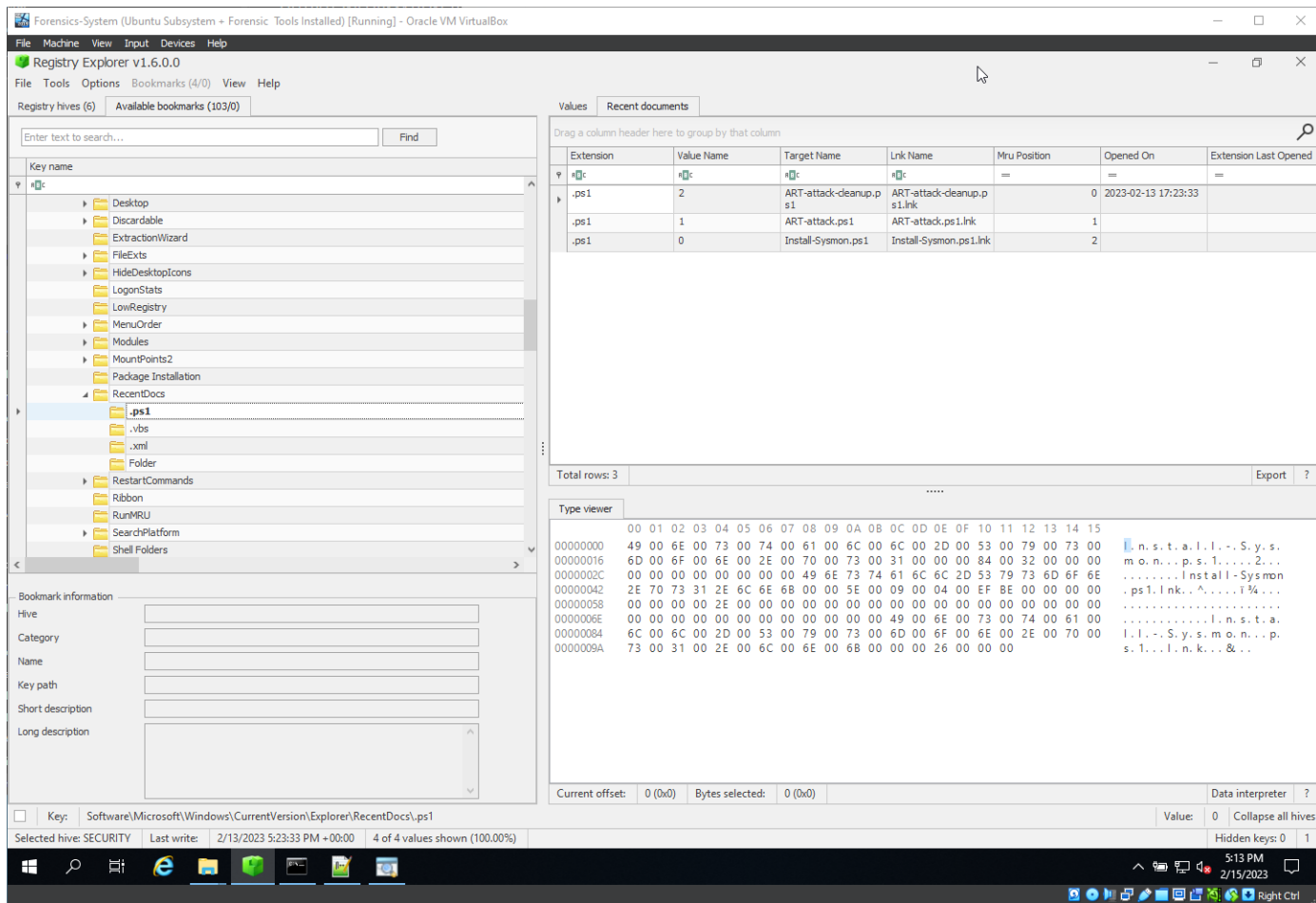
00000016 08 00 00 00 0C 00 00 00 0A 00 00 00 09 00 00 08 00 00 05 00

0000002C 02 00 00 00 01 00 00 00 FF FF FF FF

Current offset: 0 (0x0) Bytes selected: 0 (0x0) Data interpreter: ?

Selected hive: SECURITY Last write: 2/13/2023 5:23:33 PM +00:00 14 of 14 values shown (100.00%)

5:13 PM 2/15/2023



ShellBags

- With the help of shellbags, you can prove whether a specific folder was accessed by a particular user or not. You can even check whether the specific folder was created or was available or not. You can also find out whether external directories have been accessed on external devices or not.
- If changing a path, on windows explorer, change view settings or resize, this whole information is stored in shell bags, for the user experience.

- Can be found in:
- NTUSER.DAT:
 - o HKCU\Software\Microsoft\Windows\Shell\BagMRU

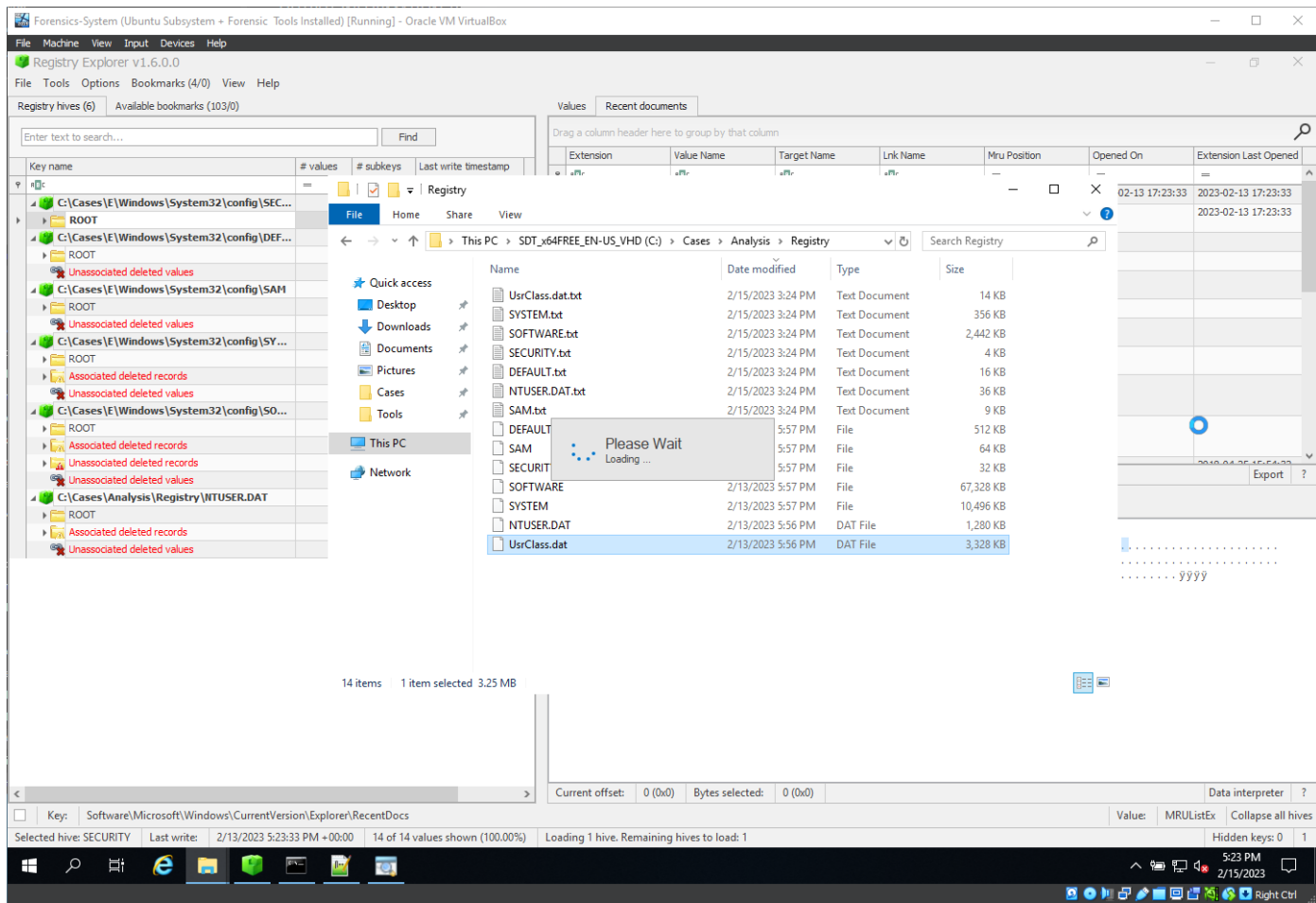
- HKCU\Software\Microsoft\Windows\Shell\Bags
- USRCLASS.DAT:
 - Software\Classes\Local
 - Settings\Software\Microsoft\Windows\Shell\BagMRU
 - Software\Classes\Local
 - Settings\Software\Microsoft\Windows\Shell\Bags
- Search for the shellbags regripper plugin in USRCLASS.dat:
- Evidence of opening folders:

shellbags v.20200428
(USRCLASS.DAT) Shell/BagMRU traversal in Win7+ USRCLASS.DAT hives

MRU Time	Modified	Accessed	Created	Zip_Subfolder	MFT File Ref	Resource
2023-02-13 17:21:42						My Games [Desktop\0\]
						My Computer [Desktop\1\]
						My Computer\D:\ [Desktop\1\0\]
						My Computer\E:\ [Desktop\1\1\]
						My Computer\Z:\ [Desktop\1\2\]
2023-02-13 17:26:02						My Computer\CLSID_Desktop [Desktop\1\3\]
2023-02-13 17:21:03	2023-02-13 17:21:04	2023-02-13 17:21:04	2023-02-13 17:21:04		22968/2	My Computer\CLSID_Desktop\PWF-main [Desktop\1\3\0\]
2023-02-13 17:21:06	2023-02-13 17:21:04	2023-02-13 17:21:04	2023-02-13 17:21:04		23026/2	My Computer\CLSID_Desktop\PWF-main\PWF-main [Desktop\1\3\0\0\]
	2023-02-13 17:21:04	2023-02-13 17:21:04	2023-02-13 17:21:04		28680/2	My Computer\CLSID_Desktop\PWF-main\PWF-main\Install-Sysmon [Desktop\1\3\0\0\0\]
2023-02-13 17:26:03	2023-02-13 17:21:04	2023-02-13 17:21:04	2023-02-13 17:21:04		28668/2	My Computer\CLSID_Desktop\PWF-main\PWF-main\AtomicRedTeam [Desktop\1\3\0\0\1\]

MFT File Ref	Resource
	My Games [Desktop\0\]
	My Computer [Desktop\1\]
	My Computer\D:\ [Desktop\1\0\]
	My Computer\E:\ [Desktop\1\1\]
	My Computer\Z:\ [Desktop\1\2\]
	My Computer\CLSID_Desktop [Desktop\1\3\]
22968/2	My Computer\CLSID_Desktop\PWF-main [Desktop\1\3\0\]
23026/2	My Computer\CLSID_Desktop\PWF-main\PWF-main [Desktop\1\3\0\0\]
28680/2	My Computer\CLSID_Desktop\PWF-main\PWF-main\Install-Sysmon [Desktop\1\3\0\0\0\]
28668/2	My Computer\CLSID_Desktop\PWF-main\PWF-main\AtomicRedTeam [Desktop\1\3\0\0\1\]

- Upload UsrClass.dat in the registry explorer:



Forensics-System (Ubuntu Subsystem + Forensic Tools Installed) [Running] - Oracle VM VirtualBox

Registry Explorer v1.6.0.0

File Tools Options Bookmarks (4/0) View Help

Registry hives (7) Available bookmarks (105/0)

Enter text to search... Find

Key name

- C:\Cases\E\Windows\System32\config\SECURITY
- C:\Cases\E\Windows\System32\config\DEFAULT
- C:\Cases\E\Windows\System32\config\SAH
- C:\Cases\E\Windows\System32\config\SYSTEM
- C:\Cases\E\Windows\System32\config\SOFTWARE
- C:\Cases\Analysis\Registry\NTUSER.DAT
- C:\Cases\Analysis\Registry\UsrClass.dat
 - BagMRU
 - 0
 - 1
 - Repository

Bookmark information

Hive:

Category:

Name:

Key path:

Short description:

Long description:

Key: S-1-5-21-1058341133-2092417715-4019509128-1000_Classes

Selected hive: SECURITY Last writer: 2/13/2023 5:23:33 PM +00:00 14 of 14 values shown (100.00%) Load complete

Values Recent documents

Drag a column header here to group by that column

Extension	Value Name	Target Name	Lnk Name	Mru Position	Opened On	Extension Last Opened
RecentDocs	11	AtomicRedTeam	AtomicRedTeam.lnk	0	2023-02-13 17:23:33	2023-02-13 17:23:33
RecentDocs	12	ART-attack-cleanup.ps1	ART-attack-cleanup.ps1.lnk	1		2023-02-13 17:23:33
RecentDocs	10	ART-attack.ps1	ART-attack.ps1.lnk	2		
RecentDocs	9	Install-Sysmon	Install-Sysmon.lnk	3		
RecentDocs	8	Install-Sysmon.ps1	Install-Sysmon.ps1.lnk	4		
RecentDocs	5	The Internet	The Internet.lnk	5		
RecentDocs	7	threat/	windowsdefender--threat.lnk	6		
RecentDocs	6	windowsdefender-///	windowsdefender---.lnk	7		
RecentDocs	4	pdp?ProductId=9WZDNCRFH2DT&ocid=QF	ms-windows-storepdp-ProductId=9WZDNCRFH2DT&ocid=QF.lnk	8		
RecentDocs	3	CD Drive (E:) 20180315-113119_2514	CD Drive (2).lnk	9		

Total rows: 23

Type viewer Slack viewer

00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F 10 11 12 13 14 15

00000000 08 00 00 00 0C 00 00 00 0A 00 00 00 09 00 00 00 08 00 00 00 05 00

00000016 00 00 07 00 00 00 06 00 00 00 04 00 00 03 00 00 00 00 00 00 00

0000002C 02 00 00 00 01 00 00 00 FF FF FF FF

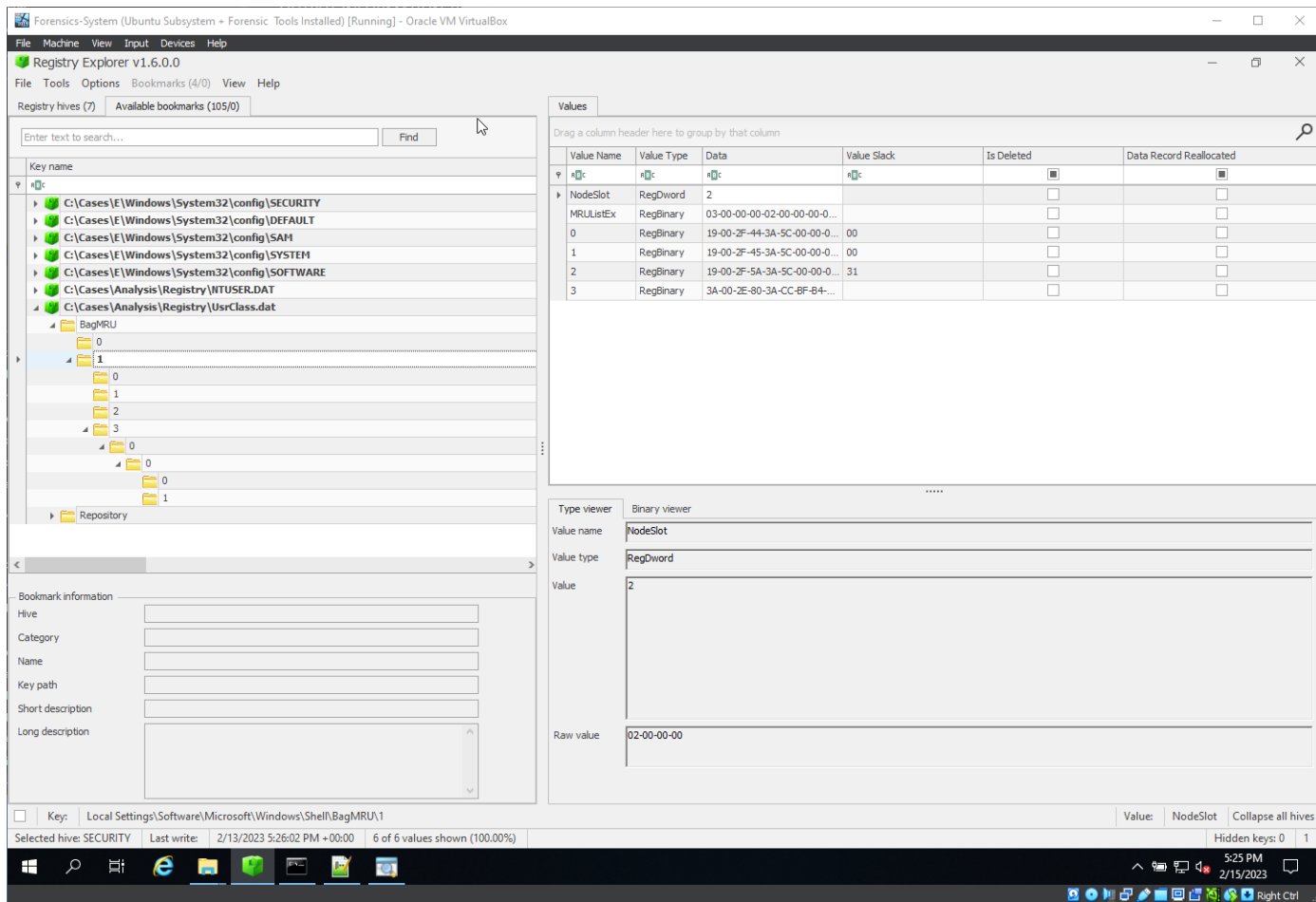
Current offset: 0 (0x0) Bytes selected: 0 (0x0) Data interpreter ?

Value: MRUListEx Collapse all hives

Hidden keys: 0 1

5:24 PM 2/15/2023

- BagMRU remembers folders names, folder paths accessed



- Switch to NTUSER.DAT:

Forensics-System (Ubuntu Subsystem + Forensic Tools Installed) [Running] - Oracle VM VirtualBox

Registry Explorer v1.6.0.0

File Tools Options Bookmarks (4/0) View Help

Registry hives (7) Available bookmarks (105/0)

Enter text to search... Find

Key name

- FTP
- History
- Internet Settings
- Main
- MountPoints2
- App Paths
- Uninstall
- PrinterPorts
- RecentDocs
- Run
- RunMRU
- RunOnce
- Shell
 - Associations
 - BagMRU
 - Bags
 - 1
 - Desktop
 - Shell Folders
 - Sysinternals
 - Taskband

Bookmark information

Hive:

Category:

Name:

Key path:

Short description:

Long description:

Values

Drag a column header here to group by that column

Value Name	Value Type	Data	Value Slack	Is Deleted	Data Record Reallocated
NodeSlots	RegBinary	02		<input type="checkbox"/>	<input type="checkbox"/>
MRUListEx	RegBinary	FF-FF-FF-FF		<input type="checkbox"/>	<input type="checkbox"/>
NodeSlot	RegDword	1		<input type="checkbox"/>	<input type="checkbox"/>

Type viewer

00000000 00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F 10 11 12 13 14 15

02

Current offset: 0 (0x0) Bytes selected: 0 (0x0)

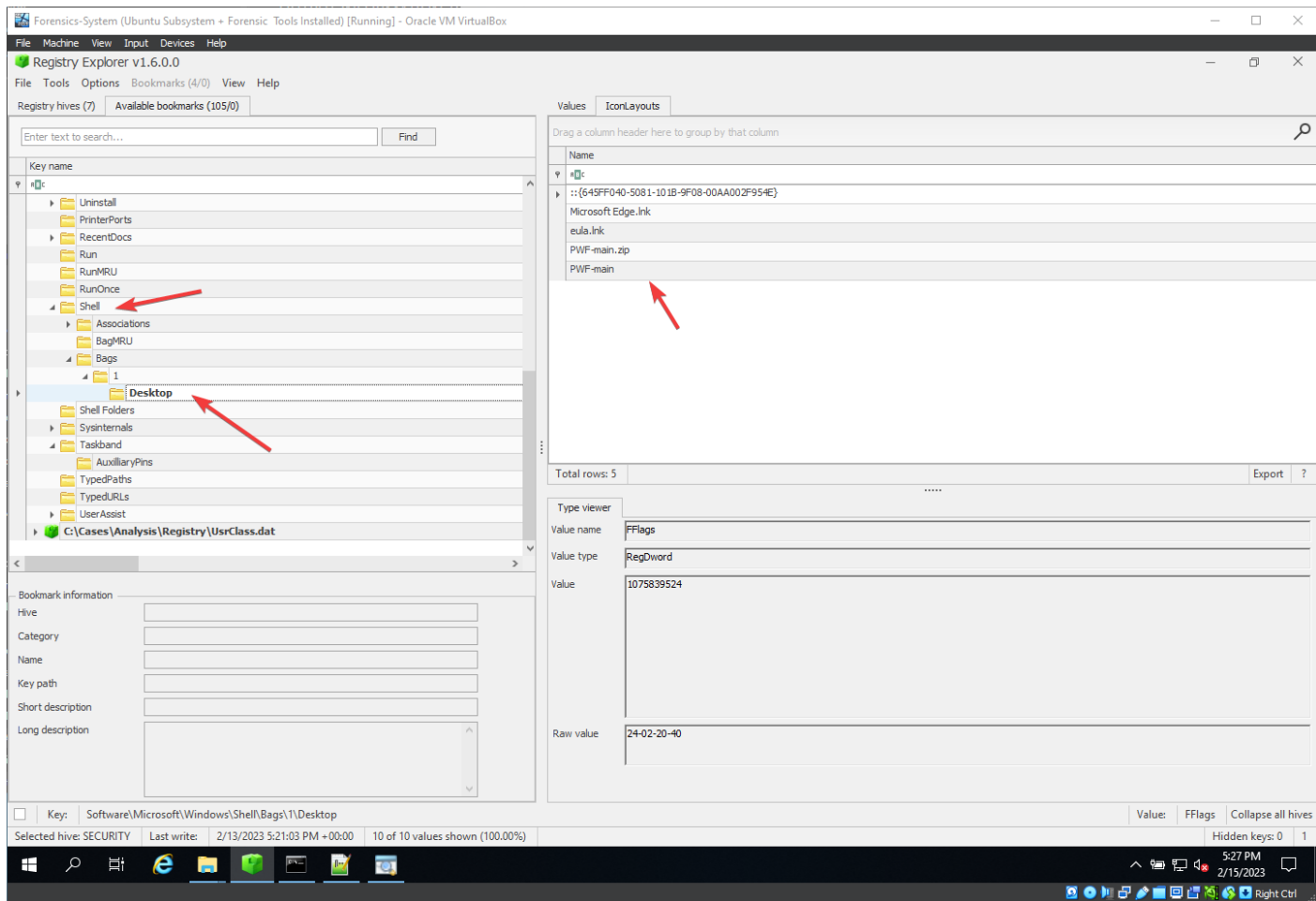
Data interpreter ?

Value: NodeSlots Collapse all hives

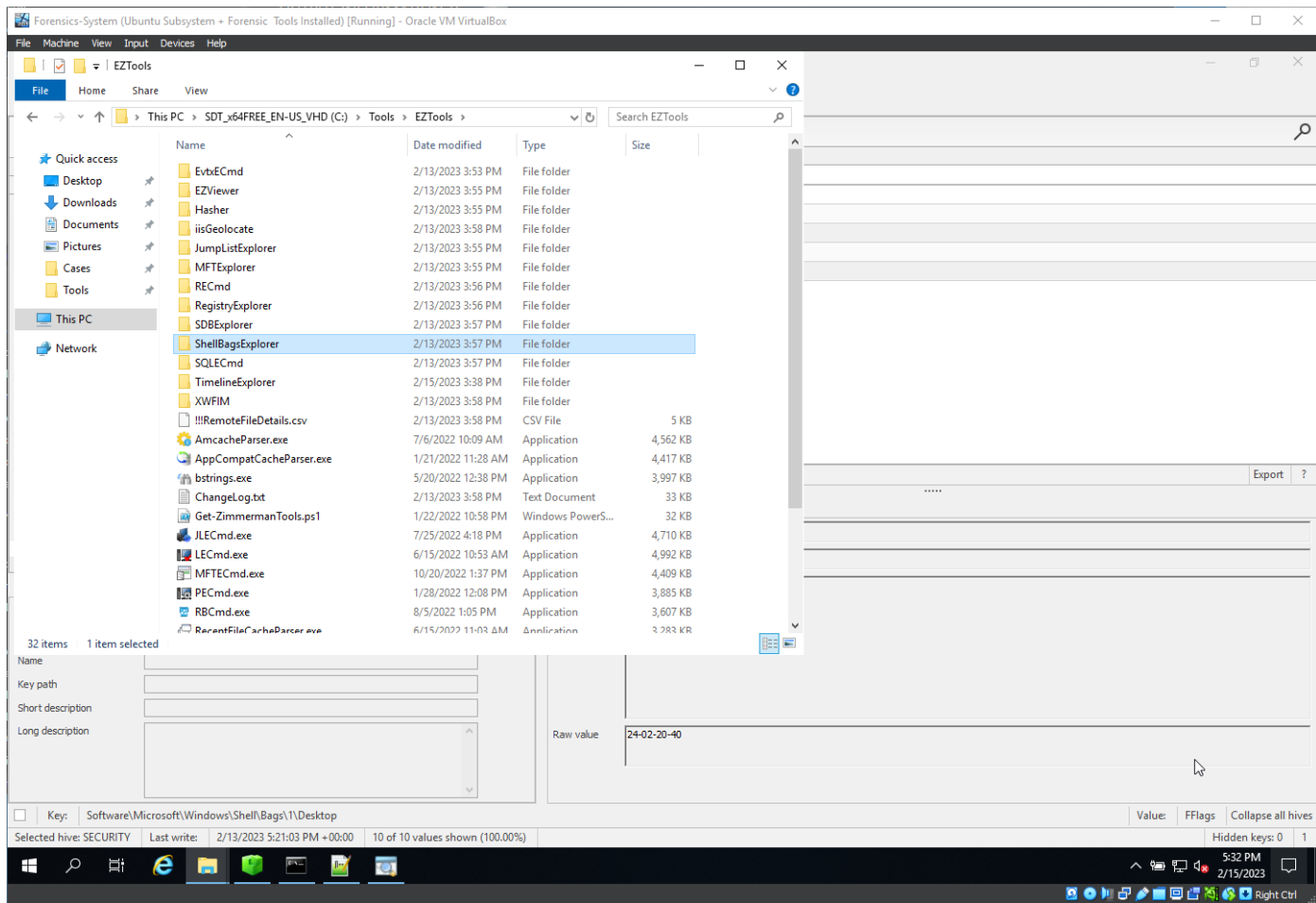
Hidden keys: 0 1

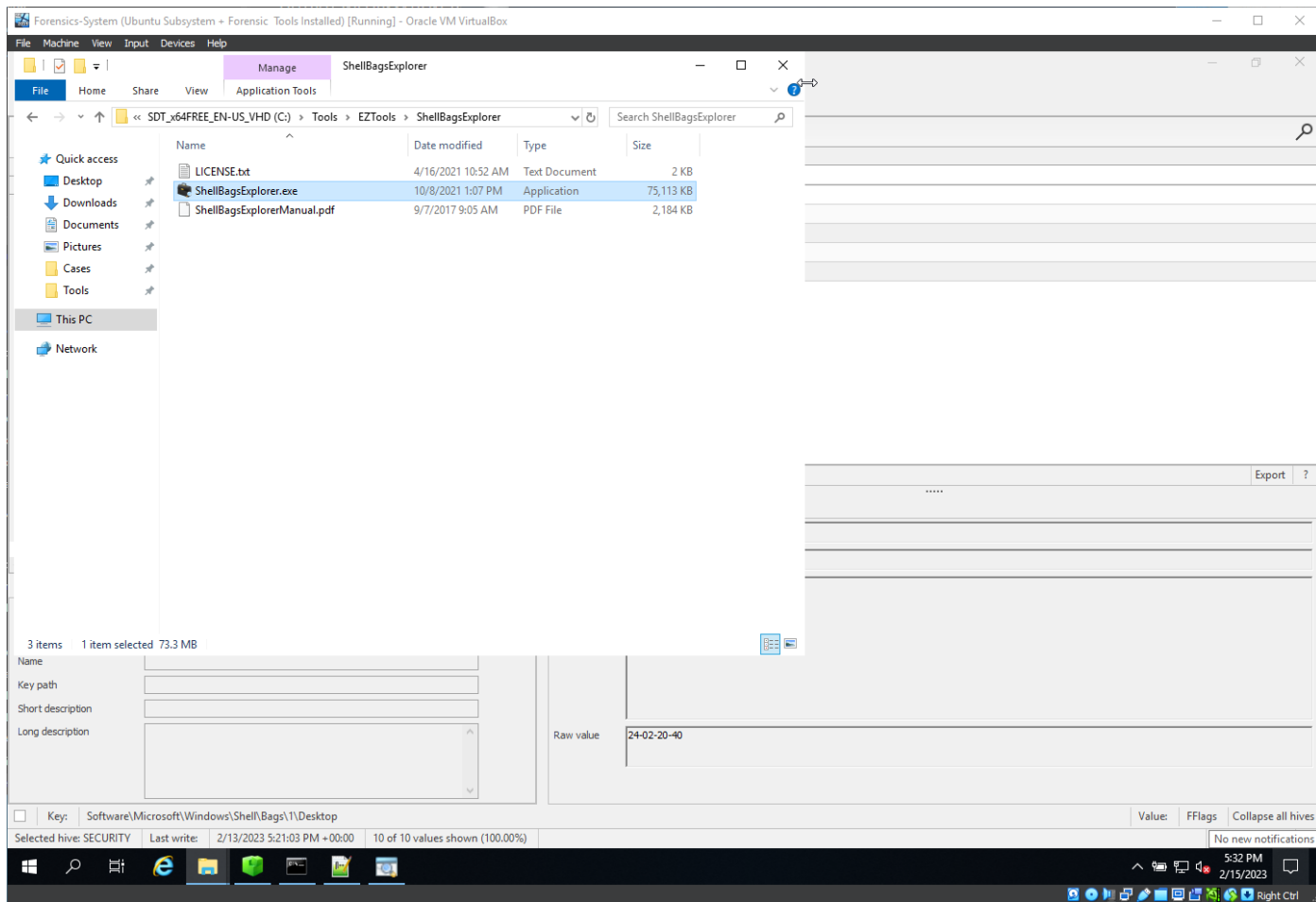
Selected hive: SECURITY Last write: 4/25/2018 3:48:32 PM +00:00 3 of 3 values shown (100.00%)

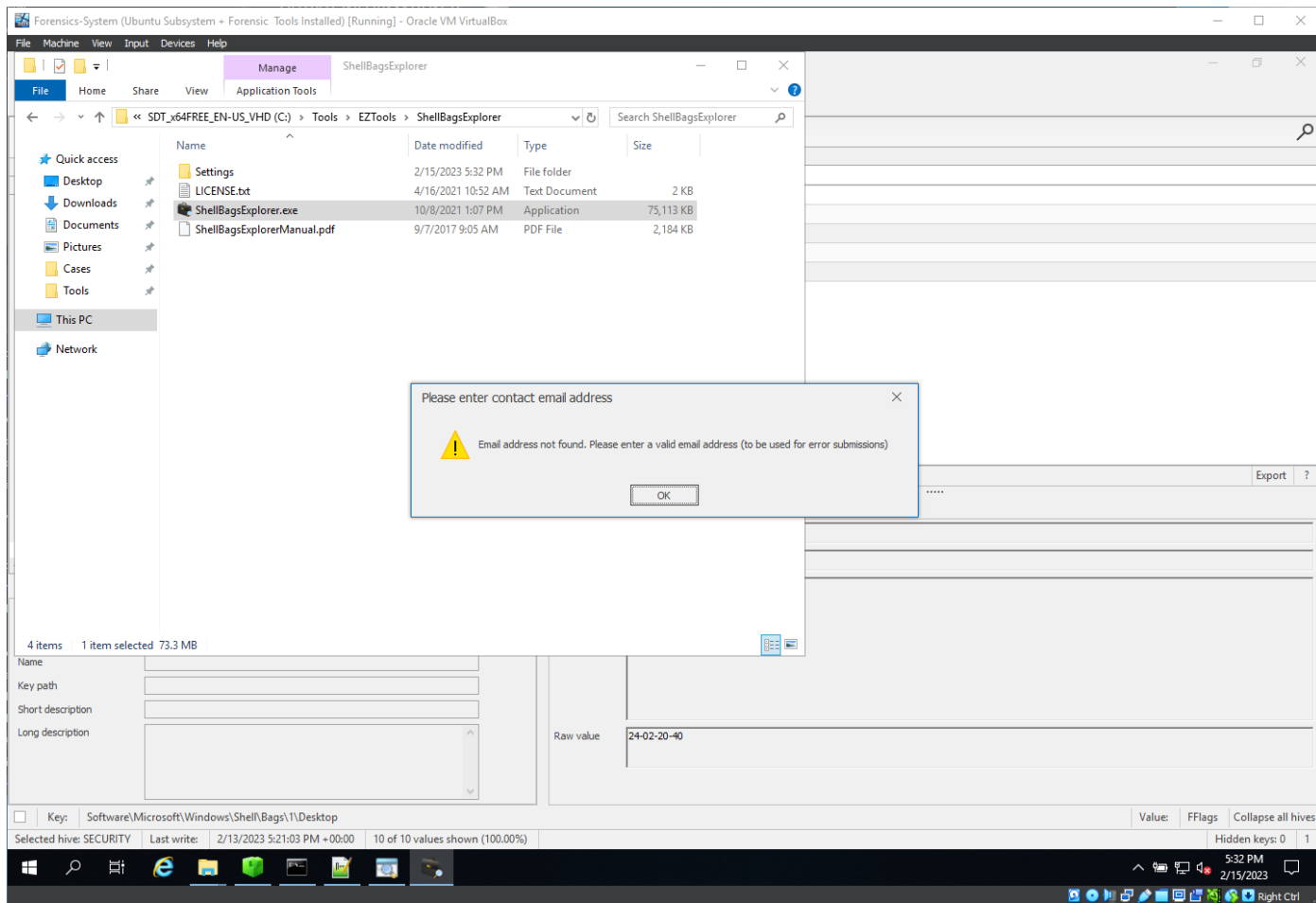
5:26 PM 2/15/2023 Right Ctrl

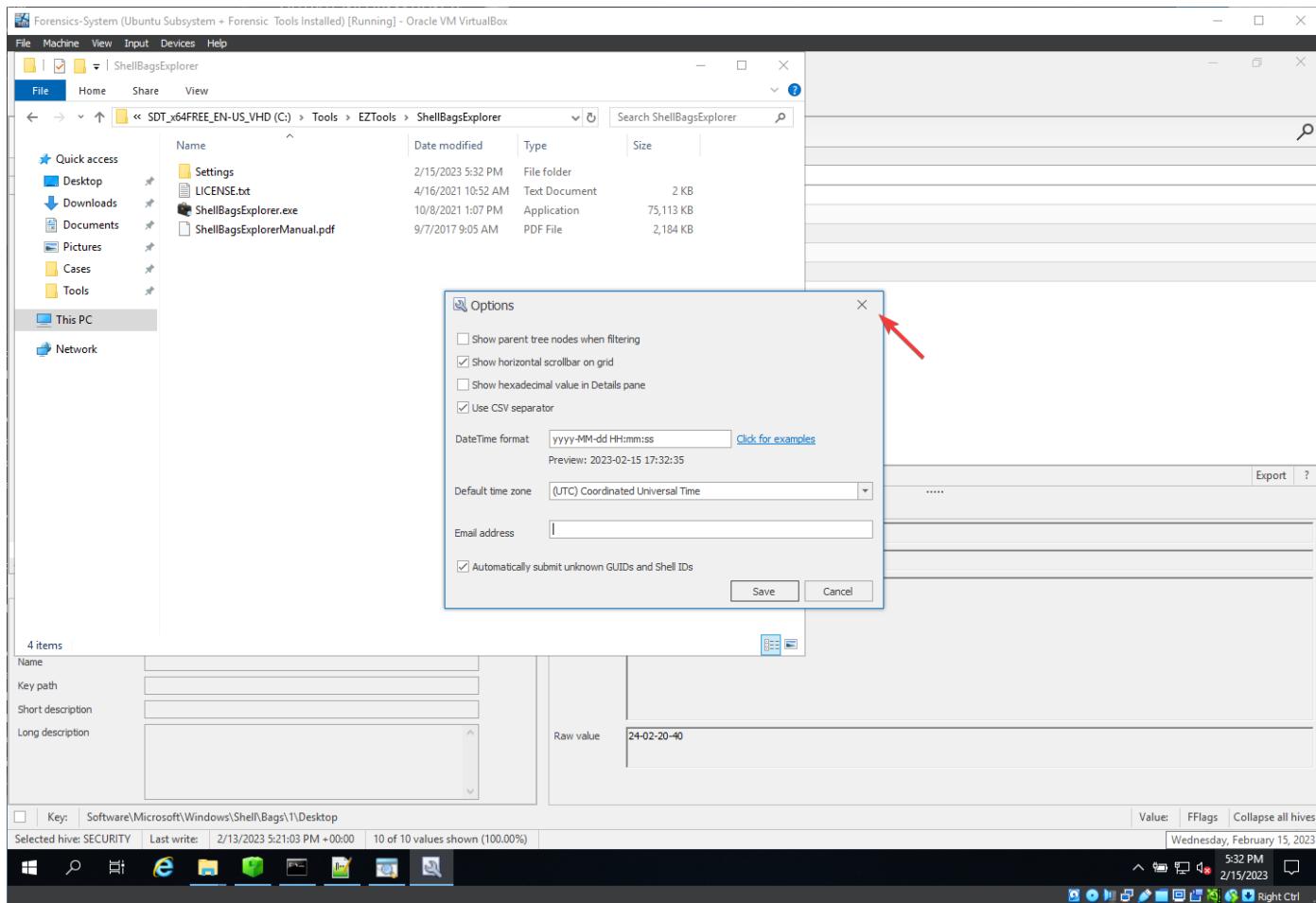


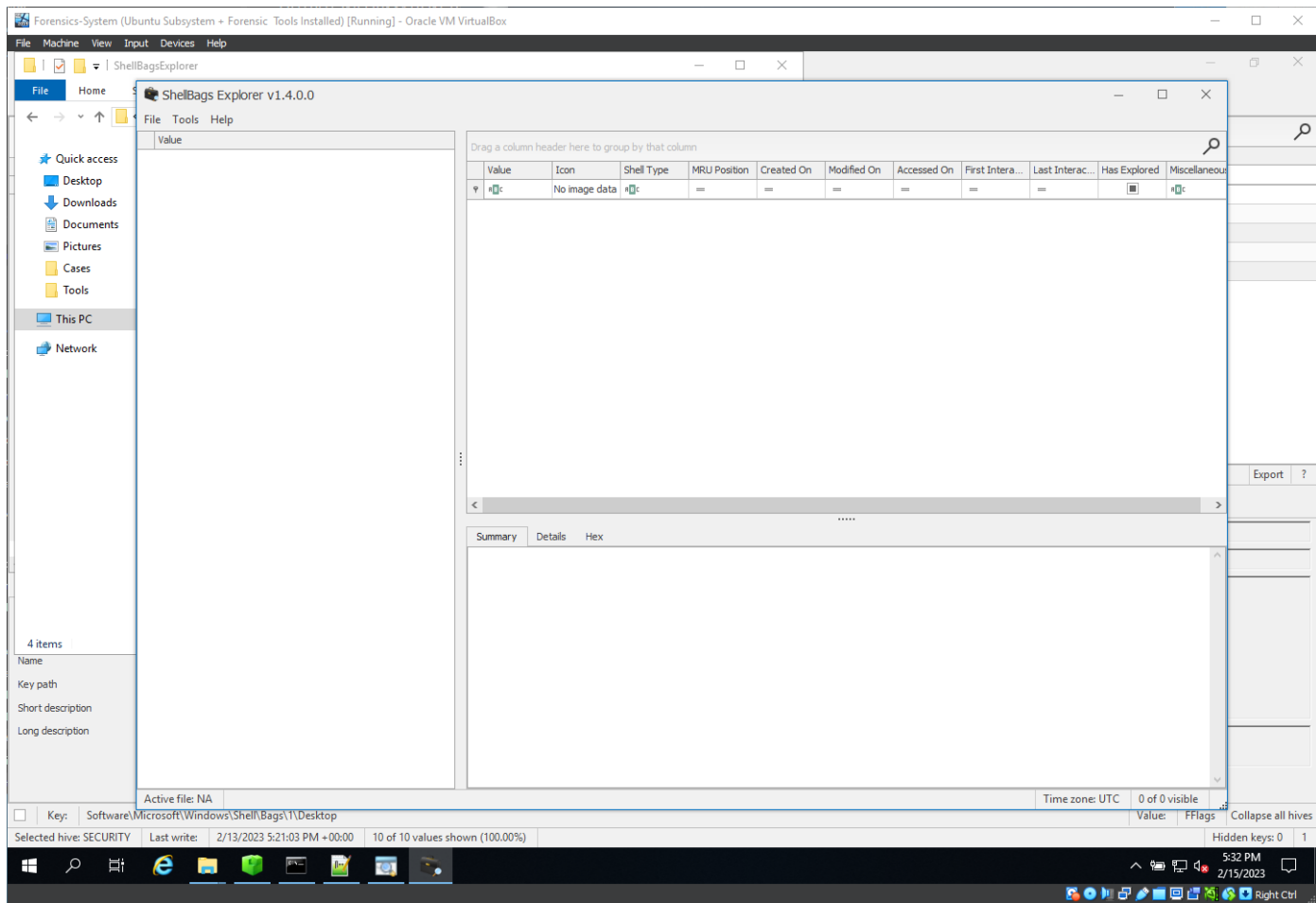
- In Bags , there exists the preferences of the user, the size of a window, path locations, etc
- IconLayouts, in the Desktop folder, explains that there was an Icon on the Desktop for that particular values.
- Different applications/tools can be used for ShellBags, for example : ShellBagsExplorer:

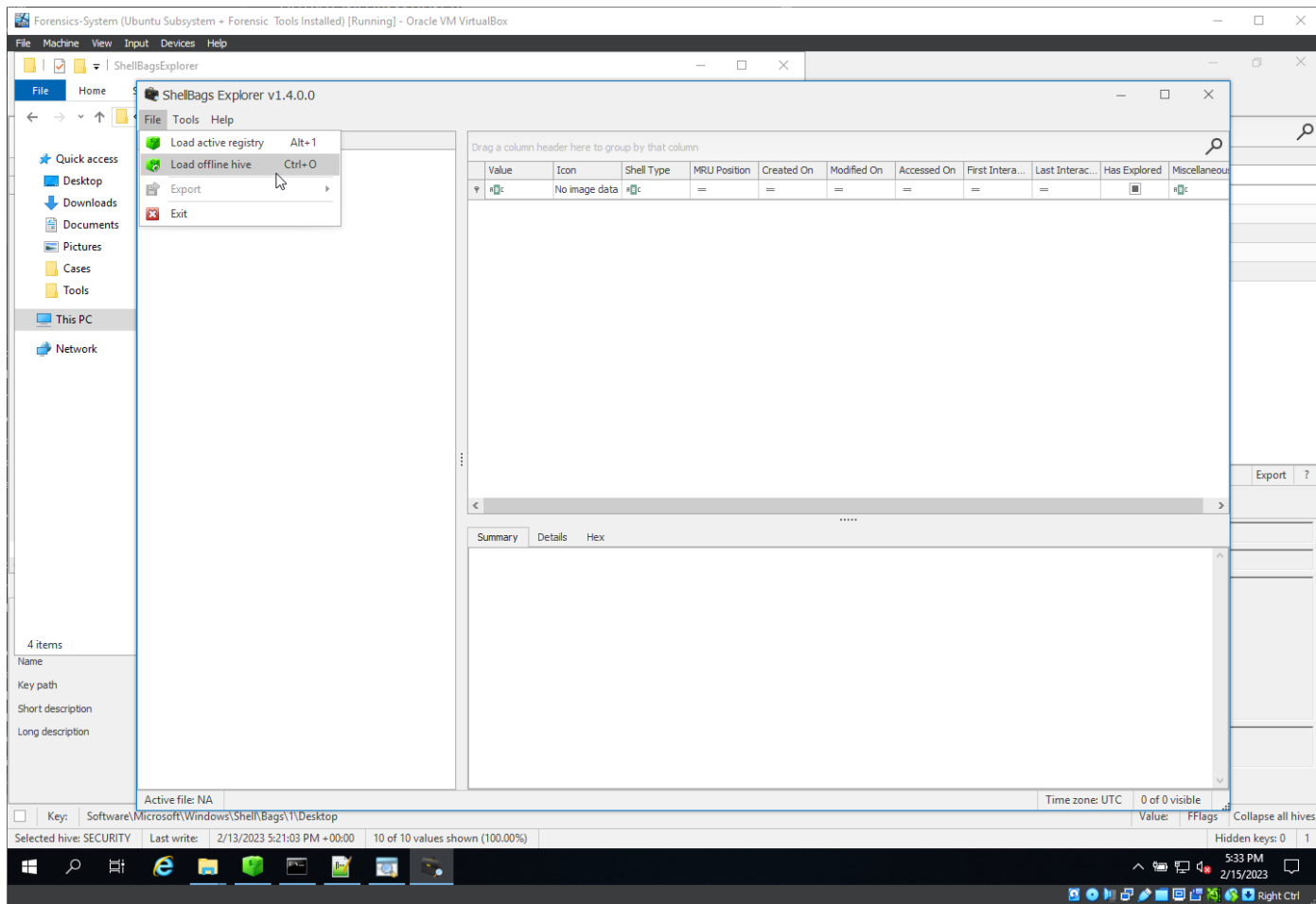




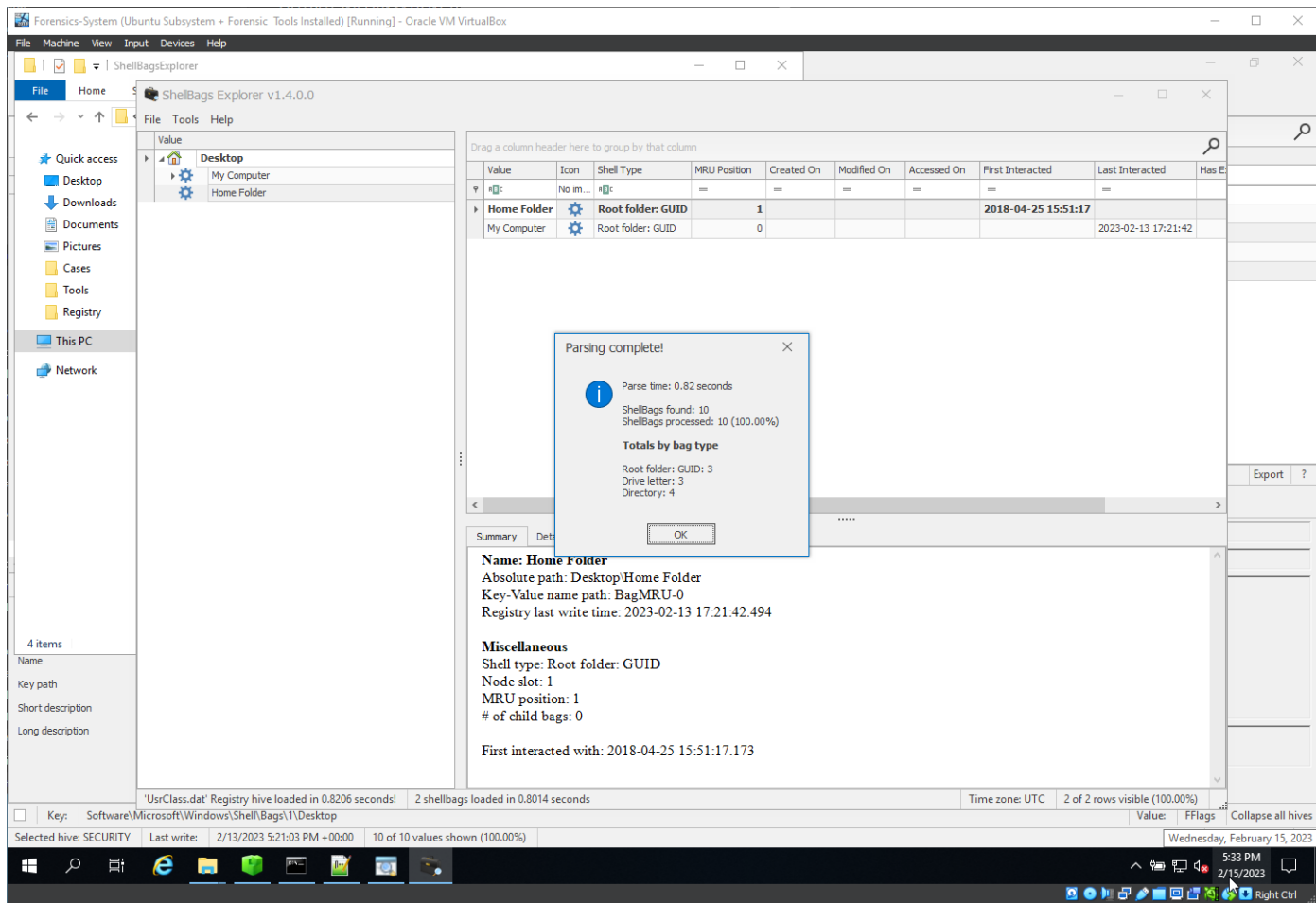








- Upload the UsrClass.dat file:



- This application helps us to see a tree structured view of the user preferences:

Forensics-System (Ubuntu Subsystem + Forensic Tools Installed) [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

ShellBags Explorer v1.4.0.0

File Tools Help

Value

Desktop

My Computer

Desktop

PWF-main

AtomicRedTeam

Install-Sysmon

Z:

E:

D:

Home Folder

Drag a column header here to group by that column

Value	Icon	Shell Type	MRU Position	Created On	Modified On	Accessed On	First Interacted	Last Interacted	Has E
Home Folder	No im...	Root folder: GUID	1				2018-04-25 15:51:17		
My Computer		Root folder: GUID	0					2023-02-13 17:21:42	

Summary Details Hex

Name: PWF-main
Absolute path: Desktop\My Computer\Desktop\PWF-main\PWF-main
Key-Value name path: BagMRU\1\3\0-0
Registry last write time: 2023-02-13 17:21:06.942

Target timestamps
Created on: 2023-02-13 17:21:04.000
Modified on: 2023-02-13 17:21:04.000
Last accessed on: 2023-02-13 17:21:04.000

Miscellaneous
Shell type: Directory
Node slot: 7
MRU position: 0

"UsrClass.dat" Registry hive loaded in 0.8206 seconds! 2 shellbags loaded in 0.8014 seconds Time zone: UTC 2 of 2 rows visible (100.00%)

Key: Software\Microsoft\Windows\Shell\Bags\1\Desktop Value: FFlags Collapse all hives

Selected hive: SECURITY Last write: 2/13/2023 5:21:03 PM +00:00 10 of 10 values shown (100.00%) Hidden keys: 0 1

5:34 PM 2/15/2023 Right Ctrl

Forensics-System (Ubuntu Subsystem + Forensic Tools Installed) [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

ShellBags Explorer v1.4.0.0

File Tools Help

Quick access

- Desktop
- Downloads
- Documents
- Pictures
- Cases
- Tools
- Registry

This PC

Network

4 items

Name

Key path

Short description

Long description

Value

Desktop

My Computer

Desktop

PWF-main

AtomicRedTeam

Install-Sysmon

Z:

E:

D:

Home Folder

Drag a column header here to group by that column

Value	Icon	Shell Type	MRU Position	Created On	Modified On	Accessed On	First Interacted	Last Interacted	Has E
*c:	No im...	*c:	=	=	=	=	=	=	

Summary Details Hex

Name: AtomicRedTeam

Absolute path: Desktop\My Computer\Desktop\PWF-main\PWF-main\AtomicRedTeam

Key-Value name path: BagMRU\1\3\0\0-1

Registry last write time: 2023-02-13 17:26:03.960

Target timestamps

Created on: 2023-02-13 17:21:04.000

Modified on: 2023-02-13 17:21:04.000

Last accessed on: 2023-02-13 17:21:04.000

Miscellaneous

Shell type: Directory

Node slot: 9

MRU position: 0

of child bags: 0

First interacted with: 2023-02-13 17:21:42.494

Last interacted with: 2023-02-13 17:26:03.960

'UsrClass.dat' Registry hive loaded in 0.8206 seconds! 0 shellbags loaded in 0.0023 seconds

Time zone: UTC 0 of 0 rows visible (NaN)

Key: Software\Microsoft\Windows\Shell\Bags\1\Desktop

Selected hive: SECURITY Last write: 2/13/2023 5:21:03 PM ~00:00 10 of 10 values shown (100.00%)

Value: FFlags Collapse all hives

5:35 PM 2/15/2023

Right Ctrl