Task-1

Drives and Partition in Linux

First, we are going to analyze and gather information about our disk

Using command "**sudo fdisk -l**"

```
┌──(kali㉿kali)-[~]
└─$ sudo fdisk -l
Disk /dev/sda: 80 GiB, 85899345920 bytes, 167772160 sectors
Disk model: VBOX HARDDISK
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: dos
Disk identifier: 0xea9da5e6

Device     Boot     Start       End   Sectors  Size Id Type
/dev/sda1  *         2048 165771263 165769216   79G 83 Linux
/dev/sda2       165773310 167770111   1996802  975M  5 Extended
/dev/sda5       165773312 167770111   1996800  975M 82 Linux swap / Solaris


Disk /dev/sdb: 14.91 GiB, 16008609792 bytes, 31266816 sectors
Disk model: Cruzer Blade
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
```

Getting information about the list devices and drives recognized by our machine

Analyzing **/dev** directory

```
┌──(kali㉿kali)-[~]
└─$ cd ../../dev

┌──(kali㉿kali)-[/dev]
└─$ ls
autofs           mqueue    stdout  tty31  tty56  vcs6
block            net       tty     tty32  tty57  vcs7
bsg              null      tty0    tty33  tty58  vcs8
btrfs-control    nvram     tty1    tty34  tty59  vcsa
bus              port      tty10   tty35  tty6   vcsa1
cdrom            ppp       tty11   tty36  tty60  vcsa2
char             psaux     tty12   tty37  tty61  vcsa3
console          ptmx      tty13   tty38  tty62  vcsa4
core             pts       tty14   tty39  tty63  vcsa5
cpu_dma_latency  random    tty15   tty4   tty7   vcsa6
cuse             rfkill    tty16   tty40  tty8   vcsa7
disk             rtc       tty17   tty41  tty9   vcsa8
dri              rtc0      tty18   tty42  ttyS0  vcsu
fb0              sda       tty19   tty43  ttyS1  vcsu1
fd               sda1      tty2    tty44  ttyS2  vcsu2
full             sda2      tty20   tty45  ttyS3  vcsu3
fuse             sda5      tty21   tty46  uhid   vcsu4
hidraw0          sdb       tty22   tty47  uinput vcsu5
hpet             sg0       tty23   tty48  urandom vcsu6
hugepages        sg1       tty24   tty49  vboxguest vcsu7
initctl          sg2       tty25   tty5   vboxuser vcsu8
```

Hardware Disk information

```
┌──(kali㉿kali)-[/dev]
└─$ sudo lshw -class disk -short
H/W path              Device      Class      Description
=========================================================
/0/100/1.1/0.0.0      /dev/cdrom  disk       CD-ROM
/0/100/6/1/2/0.0.0    /dev/sdb    disk       16GB Cruzer Blade
/0/100/6/1/2/0.0.0/0  /dev/sdb    disk       16GB
/0/100/d/0.0.0        /dev/sda    disk       85GB VBOX HARDDISK
```

Hardware Volume information

```
┌──(kali㉿kali)-[/dev]
└─$ sudo lshw -class volume -short
H/W path              Device      Class      Description
=========================================================
/0/100/d/0.0.0/1      /dev/sda1   volume     79GiB EXT4 volume
/0/100/d/0.0.0/2      /dev/sda2   volume     975MiB Extended par
/0/100/d/0.0.0/2/5    /dev/sda5   volume     975MiB Linux swap v
```

Task-2

Linux Hashing Commands

Learning about hashing commands

```
┌──(kali㉿kali)-[~/Desktop/Digital-Forensics]
└─$ printf cs362 | sha1sum
ee337f581bdf94a9270c7d6ac33acb58659d40a2  -

┌──(kali㉿kali)-[~/Desktop/Digital-Forensics]
└─$ printf cs362 | md5sum
21e807599f8ec807297d3f9d9bcbb635  -

┌──(kali㉿kali)-[~/Desktop/Digital-Forensics]
└─$ printf cs362 | sha512sum
be47fe03860b2c7330b2d15bb7911fbd4b5e73327b35d1a1857537948f92fbe3aaf28fb56bc595d5d8f0a9fdf580fb294840
f33a2df3c4fd46f07cc2cfefbd97  -

┌──(kali㉿kali)-[~/Desktop/Digital-Forensics]
└─$ #HASING A FILE

┌──(kali㉿kali)-[~/Desktop/Digital-Forensics]
└─$ echo "I am Junead" > file1.txt

┌──(kali㉿kali)-[~/Desktop/Digital-Forensics]
└─$ md5sum file1.txt
90e0189980ab80205d10254a2be0c302  file1.txt
```

Using openssl to use hashing command sha3

```
┌──(kali㉿kali)-[~/Desktop/Digital-Forensics]
└─$ printf cs362 | openssl dgst -sha3-256                                    1 ×
(stdin)= e4ca8e0e958b39280f5ba86cd8864b194645c37ac1b89a778416a1bf23e4ef0a

┌──(kali㉿kali)-[~/Desktop/Digital-Forensics]
└─$ openssl dgst -sha3-256 ./*
SHA3-256(./file1.txt)= e5a28afe5da4e4906c92e6e36a09fd76e76d0745f057c034b882b0a0f9ad6dfa
```

Task-3

Acquisition using dc3dd and dd Commands

Creating raw-image of USB

```
┌──(kali㉿kali)-[~/Desktop/Digital-Forensics]
└─$ sudo dc3dd if=/dev/sdb hash=sha1 log=usb_forensics.log of=usb_image.dd

[sudo] password for kali:

dc3dd 7.2.646 started at 2022-02-06 03:39:08 -0500
compiled options:
command line: dc3dd if=/dev/sdb hash=sha1 log=usb_forensics.log of=usb_image.dd
device size: 31266816 sectors (probed),   16,008,609,792 bytes
sector size: 512 bytes (probed)
 16008609792 bytes ( 15 G ) copied ( 100% ), 1426 s, 11 M/s

input results for device `/dev/sdb':
   31266816 sectors in
   0 bad sectors replaced by zeros
   18a088e7823b42096356933999062 3c344d59a3c (sha1)

output results for file `usb_image.dd':
   31266816 sectors out

dc3dd completed at 2022-02-06 04:02:54 -0500
```

Splitting the files of the created image

```
┌──(kali㉿kali)-[~/Desktop/Digital-Forensics]
└─$ sudo dc3dd if=/dev/sdb hash=sha1 log=usb_forensics.log ofsz=550M ofs=usb_forensics.000
[sudo] password for kali:

dc3dd 7.2.646 started at 2022-02-06 04:05:09 -0500
compiled options:
command line: dc3dd if=/dev/sdb hash=sha1 log=usb_forensics.log ofsz=550M ofs=usb_forensics.000
device size: 31266816 sectors (probed),   16,008,609,792 bytes
sector size: 512 bytes (probed)
 16008609792 bytes ( 15 G ) copied ( 100% ), 1425 s, 11 M/s

input results for device `/dev/sdb':
   31266816 sectors in
   0 bad sectors replaced by zeros
   18a088e7823b42096356933999062 3c344d59a3c (sha1)

output results for files `usb_forensics.000':
   31266816 sectors out

dc3dd completed at 2022-02-06 04:28:54 -0500


┌──(kali㉿kali)-[~/Desktop/Digital-Forensics]
└─$ ls
file1.txt          usb_forensics.006  usb_forensics.013  usb_forensics.020  usb_forensics.027
usb_forensics.000  usb_forensics.007  usb_forensics.014  usb_forensics.021  usb_forensics.log
usb_forensics.001  usb_forensics.008  usb_forensics.015  usb_forensics.022  usb_image.dd
usb_forensics.002  usb_forensics.009  usb_forensics.016  usb_forensics.023
usb_forensics.003  usb_forensics.010  usb_forensics.017  usb_forensics.024
usb_forensics.004  usb_forensics.011  usb_forensics.018  usb_forensics.025
usb_forensics.005  usb_forensics.012  usb_forensics.019  usb_forensics.026
```

Computing hash function

```
┌──(kali㉿kali)-[~/Desktop/Digital-Forensics]
└─$ cat usb_forensics.000| sha1sum
80d359c83a856e00c7a0297cab5fe46db7f9d5c7  -
```

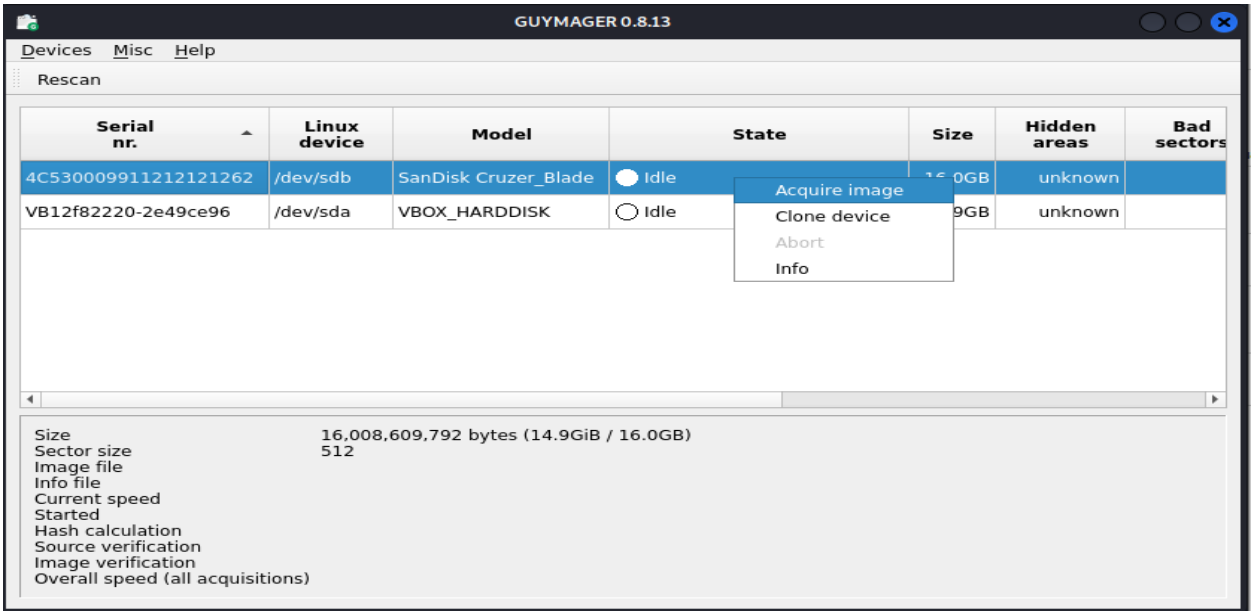
Avoid recovery of deleted files

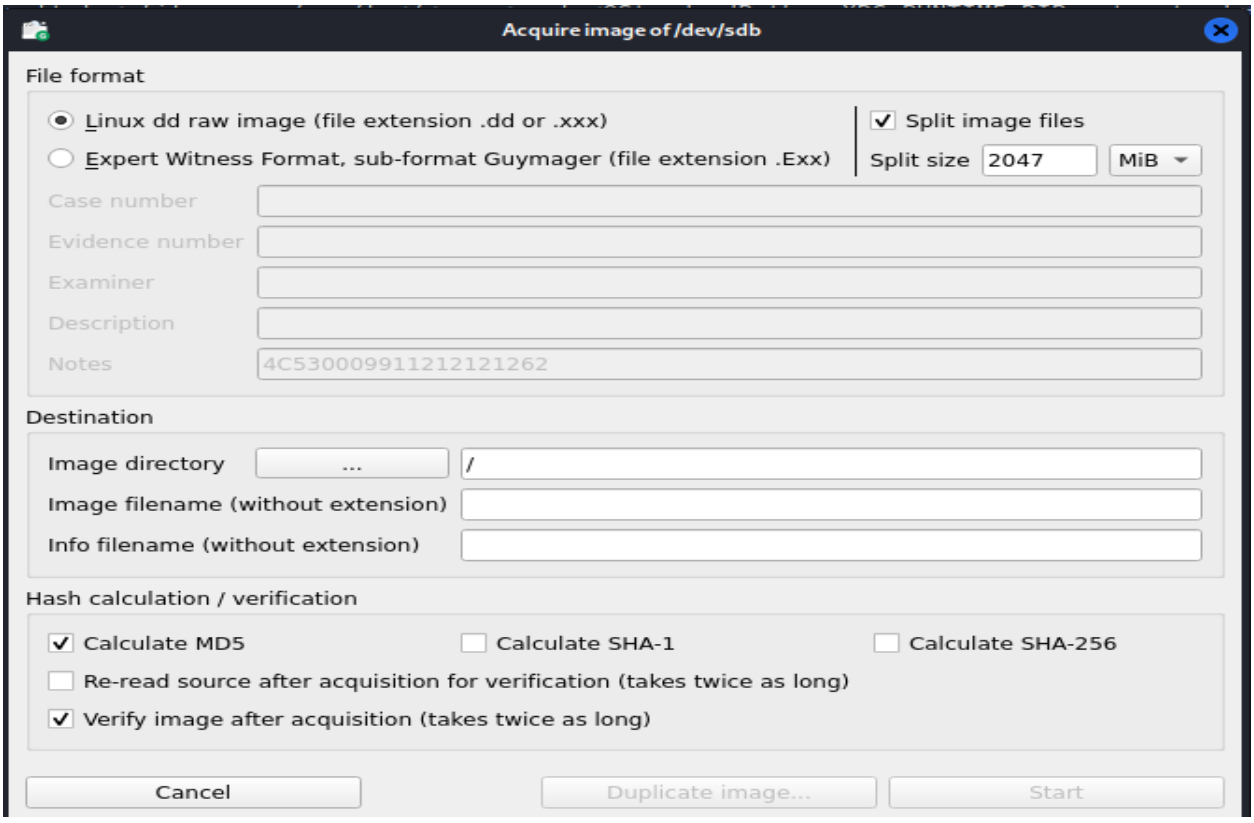
```
┌──(kali㉿kali)-[~/Desktop/Digital-Forensics]
└─$ sudo dc3dd wipe=/dev/sdb

dc3dd 7.2.646 started at 2022-02-06 05:34:35 -0500
compiled options:
command line: dc3dd wipe=/dev/sdb
device size: 31266816 sectors (probed),   16,008,609,792 bytes
sector size: 512 bytes (probed)
 16008609792 bytes ( 15 G ) copied ( 100% ), 2776 s, 5.5 M/s

input results for pattern `00':
   31266816 sectors in

output results for device `/dev/sdb':
   31266816 sectors out

dc3dd completed at 2022-02-06 06:20:52 -0500
```

```
┌──(kali㉿kali)-[~/Desktop/Digital-Forensics]
└─$ sudo dc3dd wipe=/dev/sdb tpat=happyholiday
[sudo] password for kali:

dc3dd 7.2.646 started at 2022-02-06 06:26:35 -0500
compiled options:
command line: dc3dd wipe=/dev/sdb tpat=happyholiday
device size: 31266816 sectors (probed),   16,008,609,792 bytes
sector size: 512 bytes (probed)
 16008609792 bytes ( 15 G ) copied ( 100% ), 2763 s, 5.5 M/s

input results for pattern `happyholiday':
   31266816 sectors in

output results for device `/dev/sdb':
   31266816 sectors out

dc3dd completed at 2022-02-06 07:12:37 -0500
```

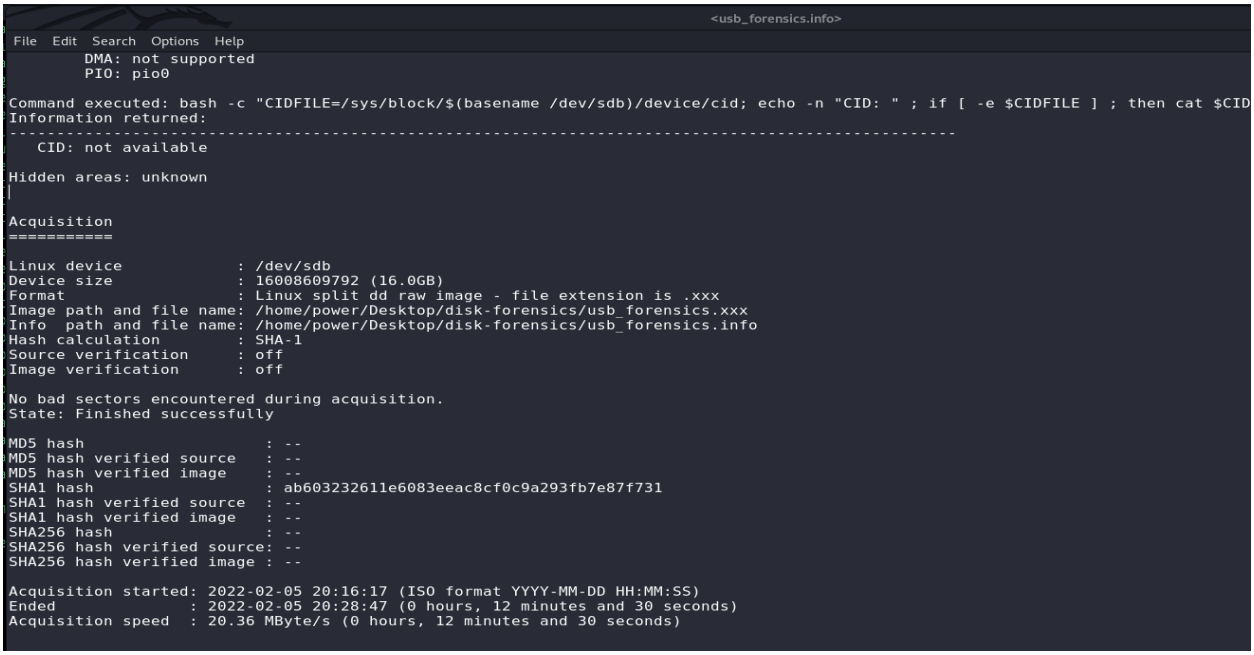
Task-4

Image Acquisition using Guymager



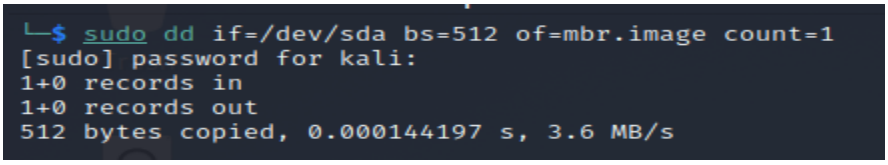


This is a graphical method of acquiring an image

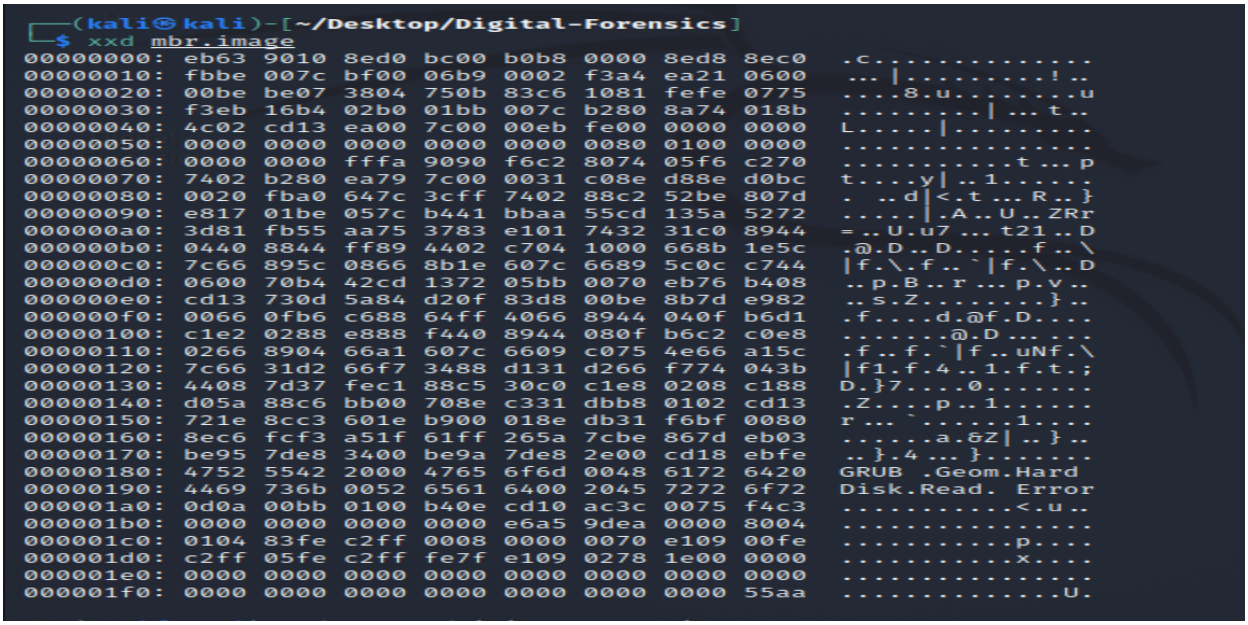


Task-5

Retrieve the Master Boot Record (MBR) using the dd Command



Reading mbr.image file in hex format



Task-6

Windows Disk Investigation with PowerShell Cmdlets

Now we are using windows PowerShell to install forensics tool and look at the details of the image

```
PS C:\tools> Find-Module -name *forensic*

NuGet provider is required to continue
PowerShellGet requires NuGet provider version '2.8.5.201' or newer to interact with NuGet-based repositories. The NuGet
 provider must be available in 'C:\Program Files\PackageManagement\ProviderAssemblies' or
'C:\Users\shehr\AppData\Local\PackageManagement\ProviderAssemblies'. You can also install the NuGet provider by running
 'Install-PackageProvider -Name NuGet -MinimumVersion 2.8.5.201 -Force'. Do you want PowerShellGet to install and
import the NuGet provider now?
[Y] Yes  [N] No  [S] Suspend  [?] Help (default is "Y"): Y

Version    Name                                Repository           Description
-------    ----                                ----------           -----------
1.1.1      PowerForensics                      PSGallery            A Digital Forensics framework for Windows PowerS...
1.1.1      PowerForensicsv2                    PSGallery            A Digital Forensics framework for Windows PowerS...
1.1.1      PowerForensicsPortable              PSGallery            A Digital Forensics framework for Windows PowerS...
1.0.0.0    Forensics                           PSGallery            The module can be used for performing some Evide...
```

```
PS C:\tools> Get-ChildItem -Path  '..\Program Files\WindowsPowerShell\Modules\'


    Directory: C:\Program Files\WindowsPowerShell\Modules


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
d-----         12/7/2019   1:31 AM                Microsoft.PowerShell.Operation.Validation
d-----         12/7/2019   1:31 AM                PackageManagement
d-----         12/7/2019   1:31 AM                Pester
d-----          2/5/2022   7:28 AM                PowerForensics
d-----         12/7/2019   1:31 AM                PowerShellGet
d-----         12/7/2019   1:31 AM                PSReadline
```

```
PS C:\tools> Import-Module -name PowerForensics
PS C:\tools> Get-Command -Module PowerForensics

CommandType     Name                                               Version    Source
-----------     ----                                               -------    ------
Cmdlet          ConvertFrom-BinaryData                             1.1.1      PowerForensics
Cmdlet          ConvertTo-ForensicTimeline                         1.1.1      PowerForensics
Cmdlet          Copy-ForensicFile                                  1.1.1      PowerForensics
Cmdlet          Get-ForensicAlternateDataStream                    1.1.1      PowerForensics
Cmdlet          Get-ForensicAmcache                                1.1.1      PowerForensics
Cmdlet          Get-ForensicAttrDef                                1.1.1      PowerForensics
Cmdlet          Get-ForensicBitmap                                 1.1.1      PowerForensics
Cmdlet          Get-ForensicBootSector                             1.1.1      PowerForensics
Cmdlet          Get-ForensicChildItem                              1.1.1      PowerForensics
Cmdlet          Get-ForensicContent                                1.1.1      PowerForensics
Cmdlet          Get-ForensicEventLog                               1.1.1      PowerForensics
Cmdlet          Get-ForensicExplorerTypedPath                      1.1.1      PowerForensics
Cmdlet          Get-ForensicFileRecord                             1.1.1      PowerForensics
Cmdlet          Get-ForensicFileRecordIndex                        1.1.1      PowerForensics
```

Checking master boot record of the volume C disk

```
PS C:\tools> Get-ForensicVolumeBootRecord -VolumeName \\.\C: -AsBytes | Format-Hex


           00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F

00000000   EB 52 90 4E 54 46 53 20 20 20 20 00 02 08 00 00  ëR□NTFS    .....
00000010   00 00 00 00 00 F8 00 00 3F 00 FF 00 00 98 01 00  .....ø..?....□..
00000020   00 00 00 00 80 00 80 00 74 E0 0A 1D 00 00 00 00  ....□.□.tà......
00000030   00 00 0C 00 00 00 00 00 02 00 00 00 00 00 00 00  ................
00000040   F6 00 00 00 01 00 00 00 FE 94 E0 AC D3 E0 AC F0  ö.......þ□à¬Óà¬ð
00000050   00 00 00 00 FA 33 C0 8E D0 BC 00 7C FB 68 C0 07  ....ú3À□Ð¼.|ûhÀ.
00000060   1F 1E 68 66 00 CB 88 16 0E 00 66 81 3E 03 00 4E  ..hf.Ë□...f□>..N
00000070   54 46 53 75 15 B4 41 BB AA 55 CD 13 72 0C 81 FB  TFSu.´A»ªUÍ.r.□û
00000080   55 AA 75 06 F7 C1 01 00 75 03 E9 DD 00 1E 83 EC  Uªu.÷Á..u.éÝ..□ì
00000090   18 68 1A 00 B4 48 8A 16 0E 00 8B F4 16 1F CD 13  .h..´H□...□ô..Í.
000000A0   9F 83 C4 18 9E 58 1F 72 E1 3B 06 0B 00 75 DB A3  □□Ä.□X.rá;...uÛ£
000000B0   0F 00 C1 2E 0F 00 04 1E 5A 33 DB B9 00 20 2B C8  ..Á.....Z3Û¹. +È
000000C0   66 FF 06 11 00 03 16 0F 00 8E C2 FF 06 16 00 E8  f........□Â....è
000000D0   4B 00 2B C8 77 EF B8 00 BB CD 1A 66 23 C0 75 2D  K.+Èwï¸.»Í.f#Àu-
000000E0   66 81 FB 54 43 50 41 75 24 81 F9 02 01 72 1E 16  f□ûTCPAu$□ù..r..
000000F0   68 07 BB 16 68 52 11 16 68 09 00 66 53 66 53 66  h.».hR..h..fSfSf
00000100   55 16 16 16 68 B8 01 66 61 0E 07 CD 1A 33 C0 BF  U...h¸.fa..Í.3À¿
00000110   0A 13 B9 F6 0C FC F3 AA E9 FE 01 90 90 66 60 1E  ..¹ö.üó ªéþ.□□f`.
00000120   06 66 A1 11 00 66 03 06 1C 00 1E 66 68 00 00 00  .f¡..f.....fh...
00000130   00 66 50 06 53 68 01 00 68 10 00 B4 42 8A 16 0E  .fP.Sh..h..´B□..
00000140   00 16 1F 8B F4 CD 13 66 59 5B 5A 66 59 66 59 1F  ...□ôÍ.fY[ZfYfY.
00000150   0F 82 16 00 66 FF 06 11 00 03 16 0F 00 8E C2 FF  .□..f........□Â.
00000160   0E 16 00 75 BC 07 1F 66 61 C3 A1 F6 01 E8 09 00  ...u¼..faÃ¡ö.è..
00000170   A1 FA 01 E8 03 00 F4 EB FD 8B F0 AC 3C 00 74 09  ¡ú.è..ôëý□ð¬<.t.
00000180   B4 0E BB 07 00 CD 10 EB F2 C3 0D 0A 41 20 64 69  ´.»..Í.ëòÃ..A di
00000190   73 6B 20 72 65 61 64 20 65 72 72 6F 72 20 6F 63  sk read error oc
000001A0   63 75 72 72 65 64 00 0D 0A 42 4F 4F 54 4D 47 52  curred...BOOTMGR
000001B0   20 69 73 20 63 6F 6D 70 72 65 73 73 65 64 00 0D   is compressed..
000001C0   0A 50 72 65 73 73 20 43 74 72 6C 2B 41 6C 74 2B  .Press Ctrl+Alt+
000001D0   44 65 6C 20 74 6F 20 72 65 73 74 61 72 74 0D 0A  Del to restart..
000001E0   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
000001F0   00 00 00 00 00 00 8A 01 A7 01 BF 01 00 00 55 AA  ......□.§.¿...Uª
```

```
PS C:\tools> Get-ForensicFileRecord -Path 'C:\Users\Public\AccountPictures\S-1-5-21-3695201621-3816592265-914291048-1
002\{A7FF035D-ADA2-460F-9C66-62C5CC0DBA77}-Image1080.jpg'


FullName             : C:\\Users\Public\AccountPictures\S-1-5-21-3695201621-3816592265-914291048-1002\{A7FF035D-ADA2
                       -460F-9C66-62C5CC0DBA77}-Image1080.jpg
Name                 : {A7FF035D-ADA2-460F-9C66-62C5CC0DBA77}-Image1080.jpg
SequenceNumber       : 2
RecordNumber         : 86762
ParentSequenceNumber : 1
ParentRecordNumber   : 86745
Directory            : False
Deleted              : False
ModifiedTime         : 9/11/2021 12:16:42 PM
AccessedTime         : 9/11/2021 12:16:42 PM
ChangedTime          : 9/11/2021 12:16:42 PM
BornTime             : 9/11/2021 12:16:42 PM
FNModifiedTime       : 9/11/2021 12:16:42 PM
FNAccessedTime       : 9/11/2021 12:16:42 PM
FNChangedTime        : 9/11/2021 12:16:42 PM
FNBornTime           : 9/11/2021 12:16:42 PM
```

Summary

This whole lab was about Disk Forensics. We have learned how to view information about the storage devices that are fitted in our system. We also did practical on how to use hashing commands and get hash of any text or file. Then we learned to create a raw image of a disk and also to avoid recovery of deleted files. We learned to use guymager software that is gui based software. We have also read the MBR (Master Record Boot) of our disk. At last, we have used Windows PowerShell to do Windows Disk Investigation.

←END→