Forensics, Report & Presentation

Technical Scope:

- Hashing, Autopsy case setup,
- Autopsy hash verification,
- Analysis,
- hidden images discovery and recovery.

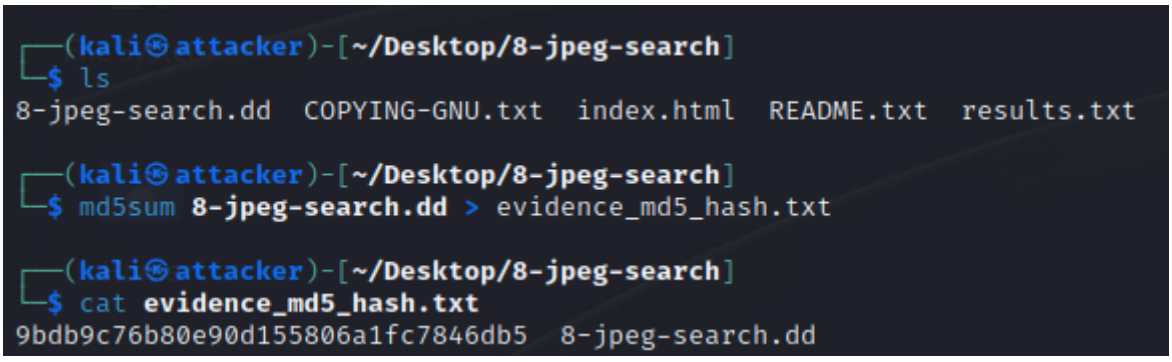
Tasks:

1. Generate MD5 hash of an image file, store the hash in a file.
2. Create a new Autopsy case with the image in question, verify the hash with Autopsy.
3. Verify that the hash in Autopsy matches the original hash taken.
4. Perform file analysis. Search & recover the 5 hidden JPG image files.
5. Analyze findings: explain why these artifacts are significant from a forensic perspective.
6. Finalize VAPT report.
7. Work on the presentation deck.

Hashing & Integrity

MD5sum correctly run, hash saved to a file.

```
md5sum 8-jpeg-search.dd

# Save hash to evidence file
md5sum 8-jpeg-search.dd > evidence_md5_hash.txt

# Verify against expected value
EXPECTED="9bdb9c76b80e90d155806a1fc7846db5"
```

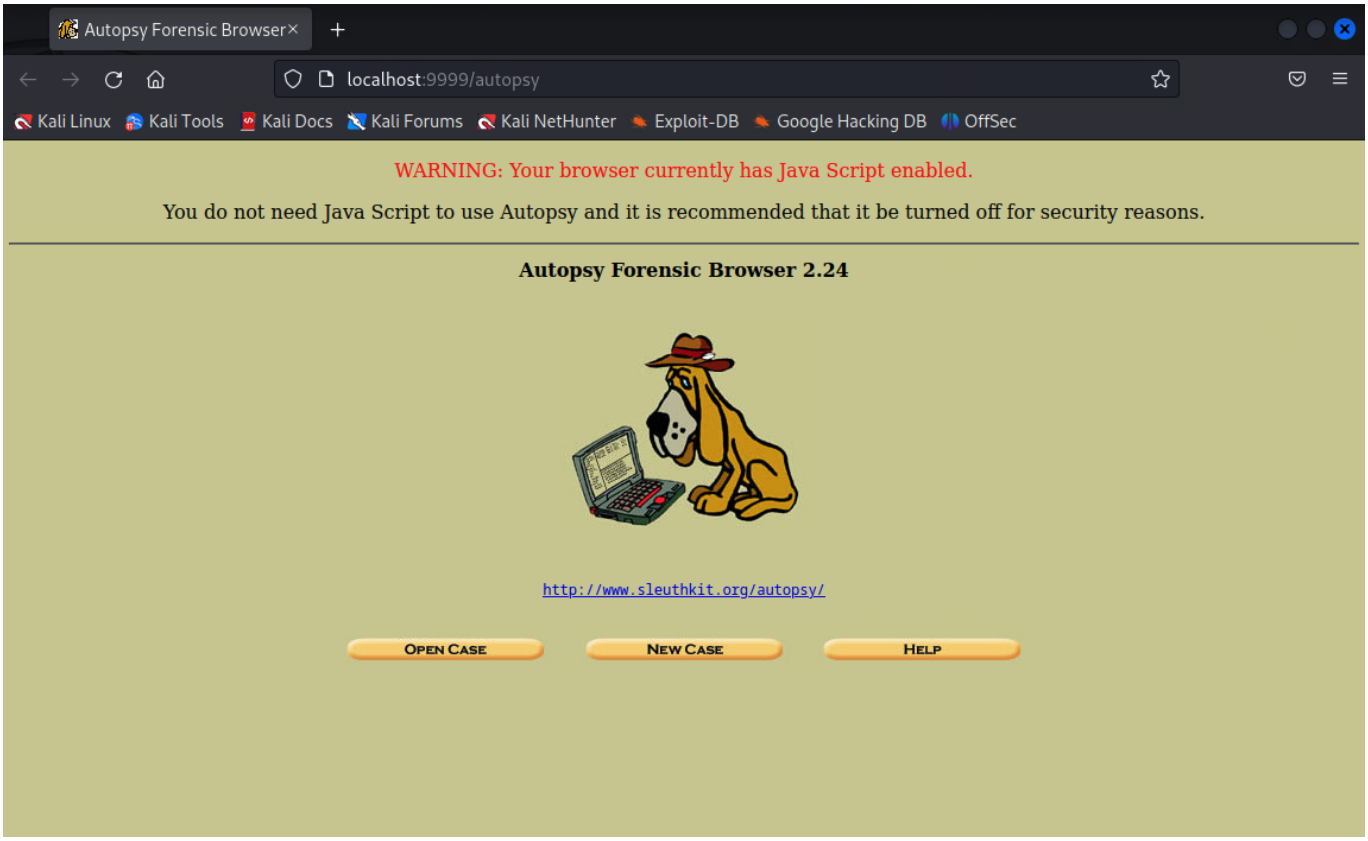


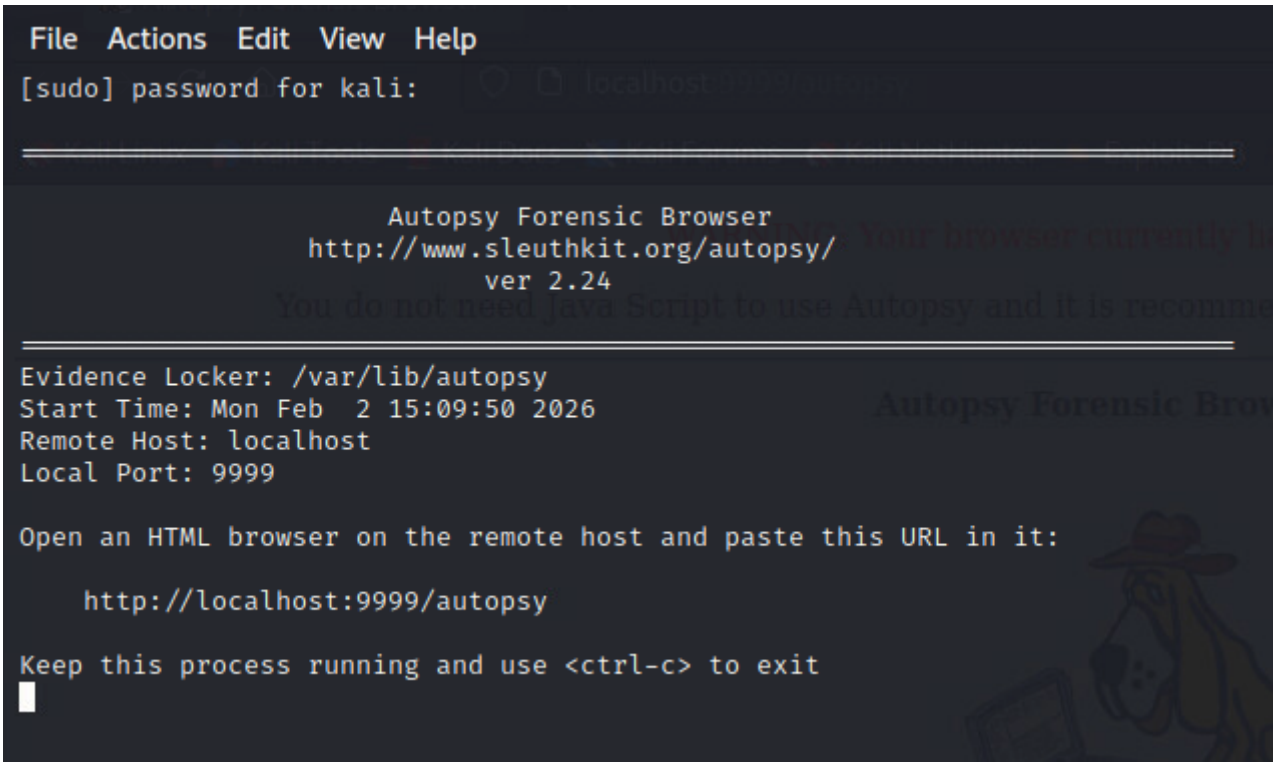

```
cp 8-jpeg-search.dd 8-jpeg-search-forensic-copy.dd

# Verify copy integrity
md5sum 8-jpeg-search_forensic_copy.dd > copy_md5_hash.txt
```

```
┌──(kali㉿attacker)-[~/Desktop/8-jpeg-search]
└─$ cat evidence_md5_hash.txt
9bdb9c76b80e90d155806a1fc7846db5  8-jpeg-search.dd

┌──(kali㉿attacker)-[~/Desktop/8-jpeg-search]
└─$ cat evidence_md5_hash_copy.txt
9bdb9c76b80e90d155806a1fc7846db5  8-jpeg-search-forensic-copy.dd
```

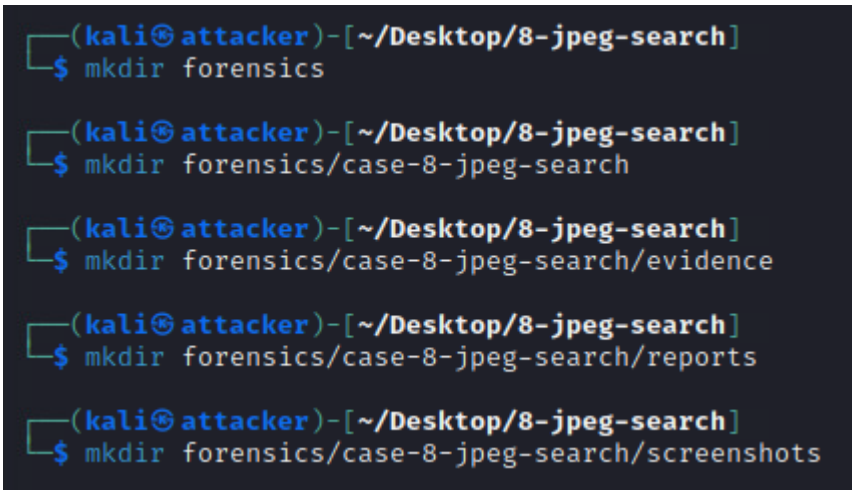
```
diff 8-jpeg-search.dd otro 8-jpeg-search_forensic_copy.dd
```

```
autopsy
```



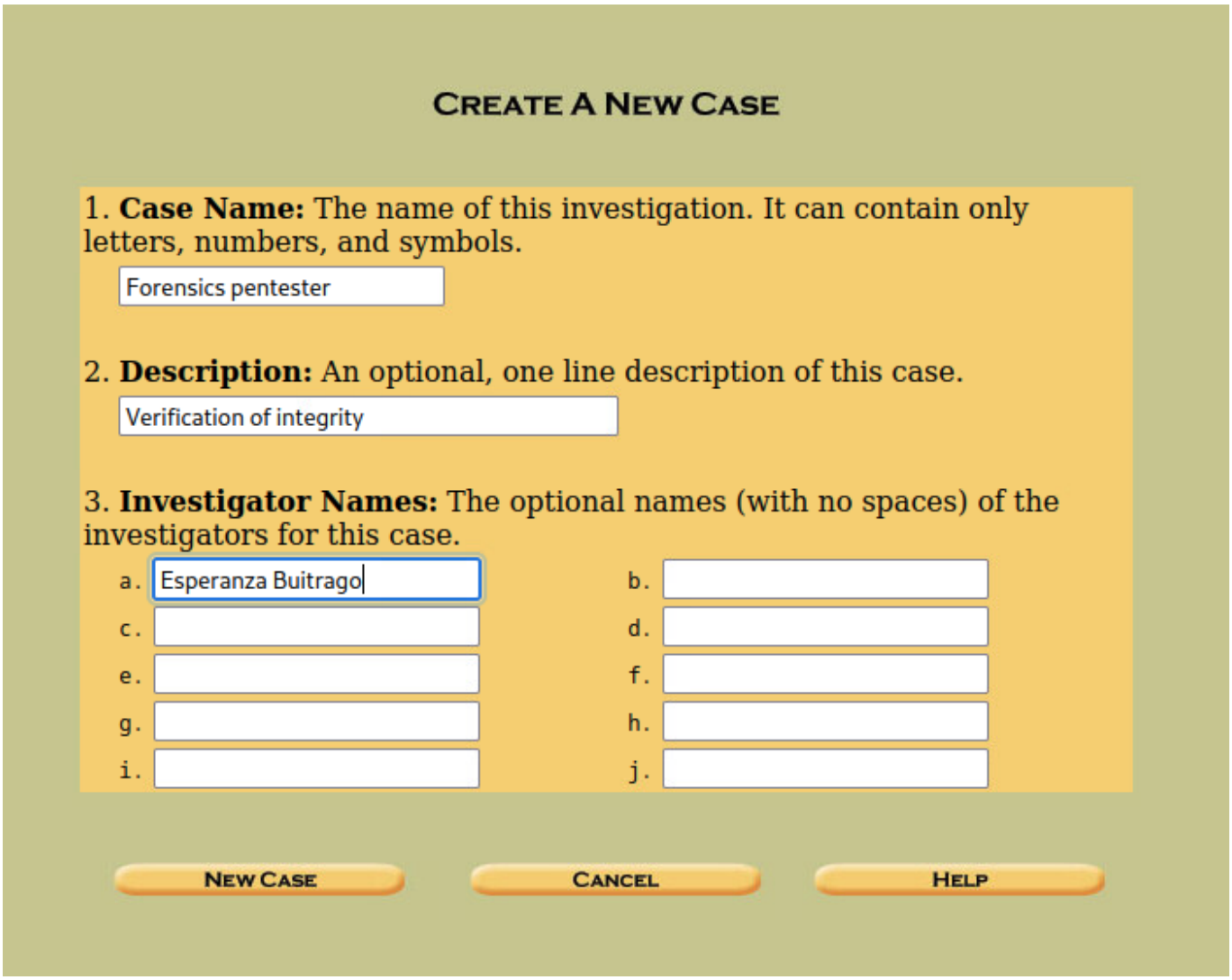



```
/home/kali/forensics/
├── 8-jpeg-search-forensics/
│   ├── evidence/
│   ├── reports/
│   └── screenshots/
```

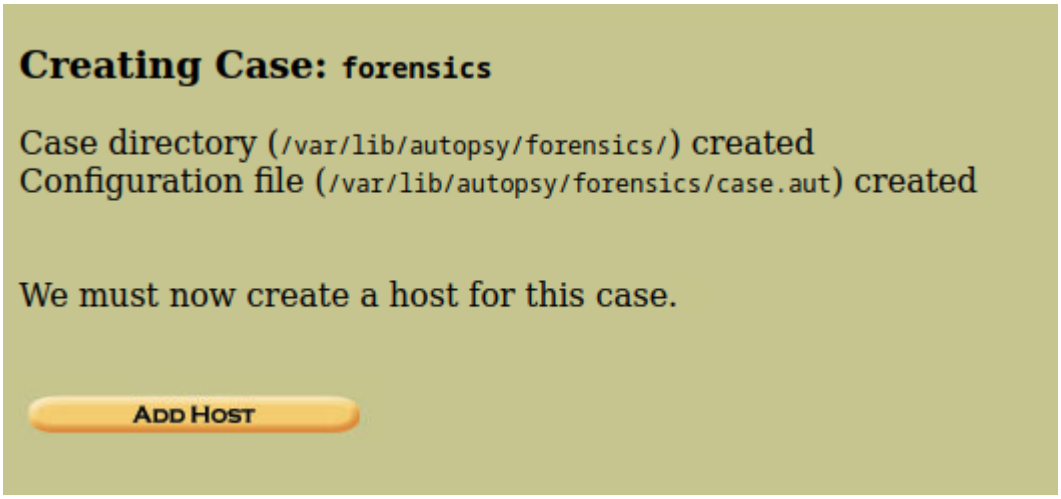


Autopsy Case Setup

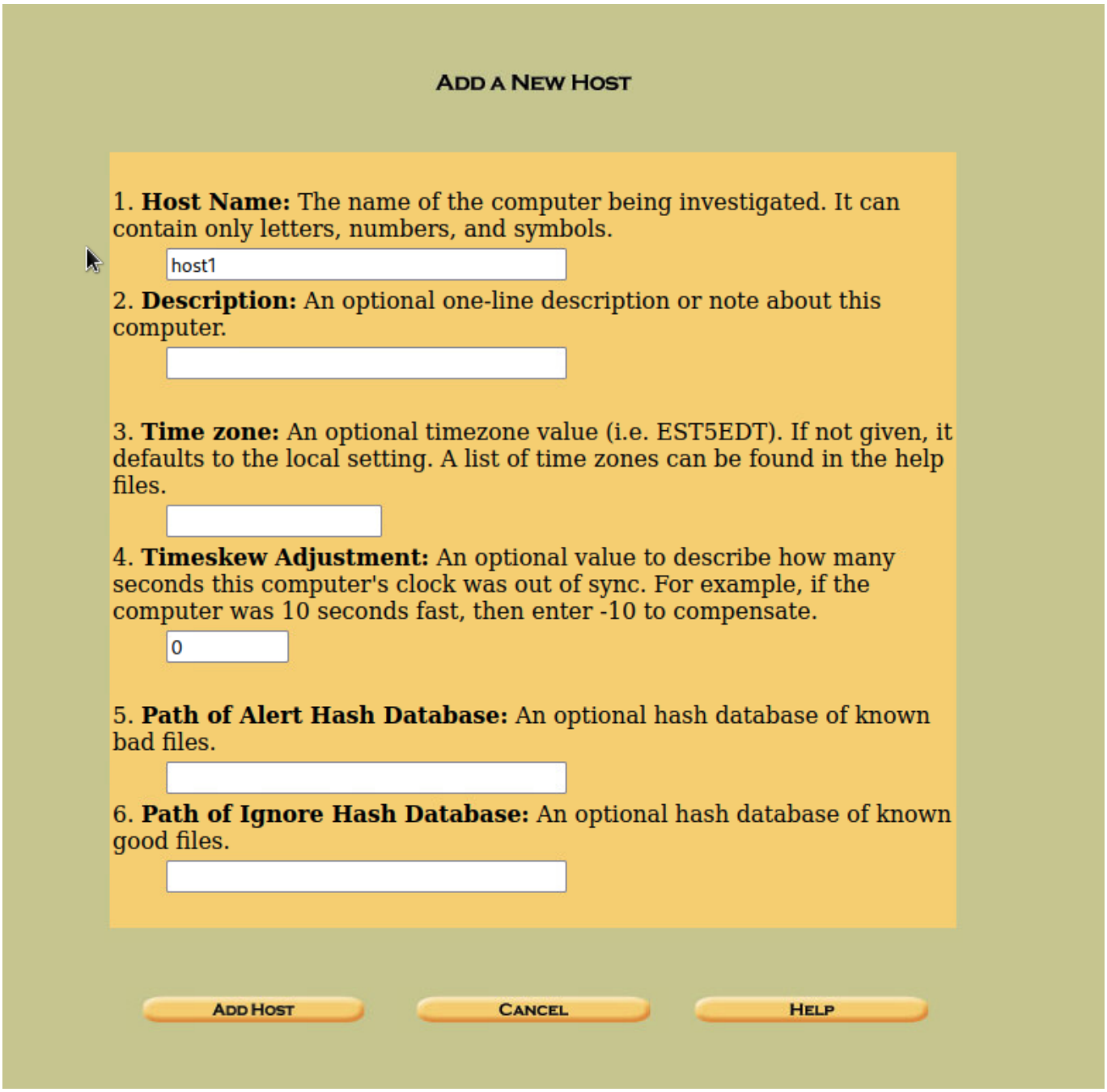
Case created with correct metadata (case name, description, investigator's name).

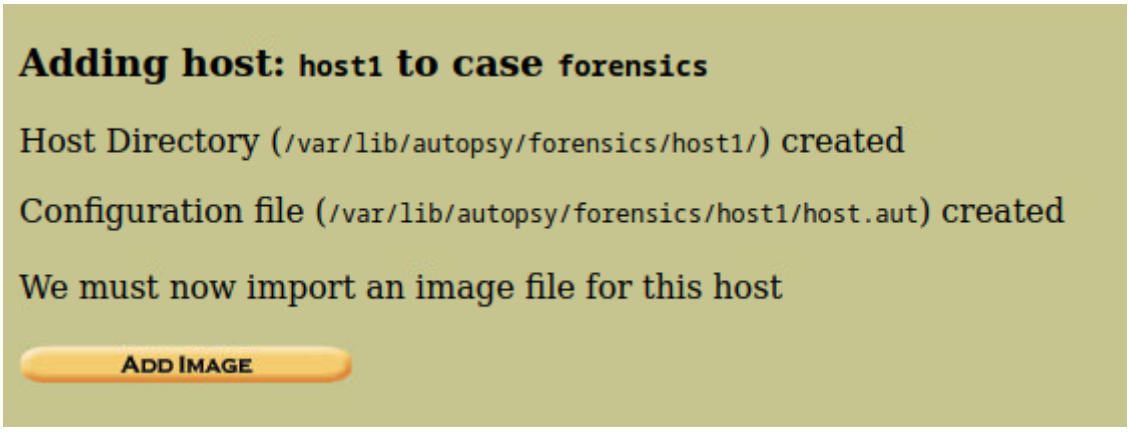


Forensic image added successfully.



Add host

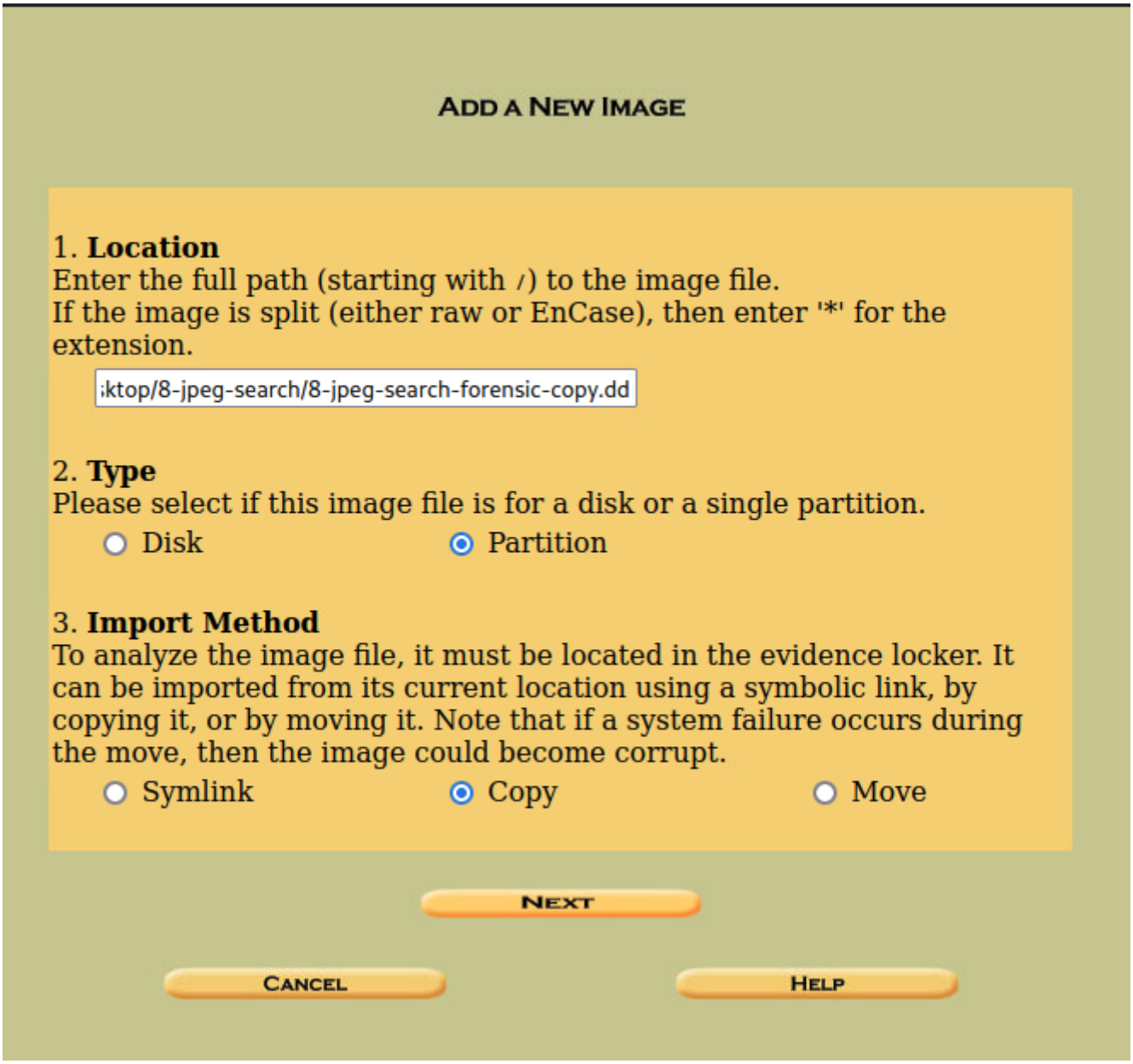




Add directory

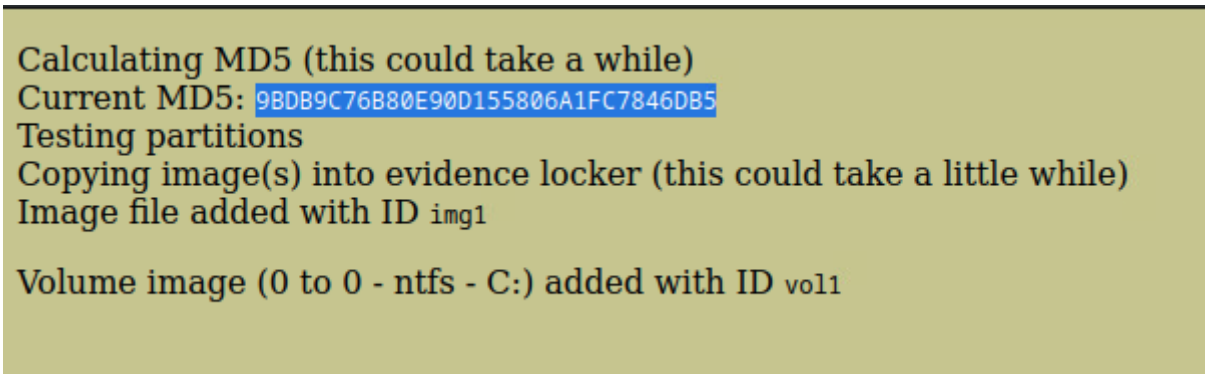
```
┌──(kali㉿attacker)-[~/Desktop/8-jpeg-search]
└─$ pwd
/home/kali/Desktop/8-jpeg-search

┌──(kali㉿attacker)-[~/Desktop/8-jpeg-search]
└─$ ls -al
total 20148
drwx------ 2 kali kali     4096 Feb  4 08:16 .
drwxr-xr-x 3 kali kali     4096 Jan 16  2025 ..
-rw-r--r-- 1 kali kali 10289152 Jun 10  2004 8-jpeg-search.dd
-rw-r--r-- 1 kali kali 10289152 Feb  2 14:47 8-jpeg-search-forensic-copy.dd
-rw-r--r-- 1 kali kali    18009 Jun  9  2004 COPYING-GNU.txt
-rw-r--r-- 1 kali kali       65 Feb  2 14:49 evidence_md5_hash_copy.txt
-rw-r--r-- 1 kali kali       51 Feb  2 14:41 evidence_md5_hash.txt
-rw-r--r-- 1 kali kali     5615 Jun 10  2004 index.html
-rw-r--r-- 1 kali kali      799 Jun  9  2004 README.txt
-rw-r--r-- 1 kali kali     2368 Jun 10  2004 results.txt
```

We are going to use `8-jpeg-search-forensic-copy.dd`, to preserve the integrity of the original image `8-jpeg-search.dd`.



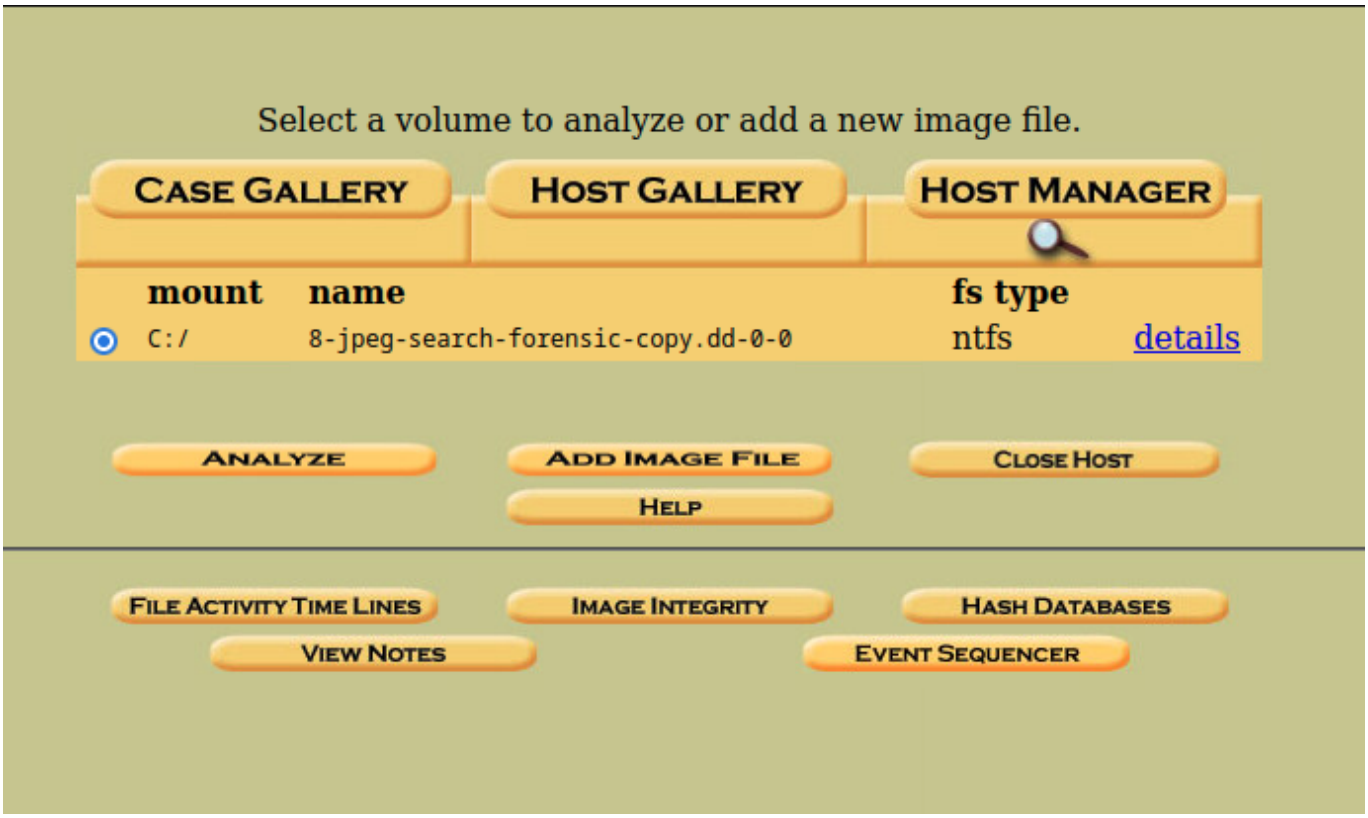
Same hash verified in Autopsy.

We should have the same hash that we already calculated before: `9bdb9c76b80e90d155806a1fc7846db5`.

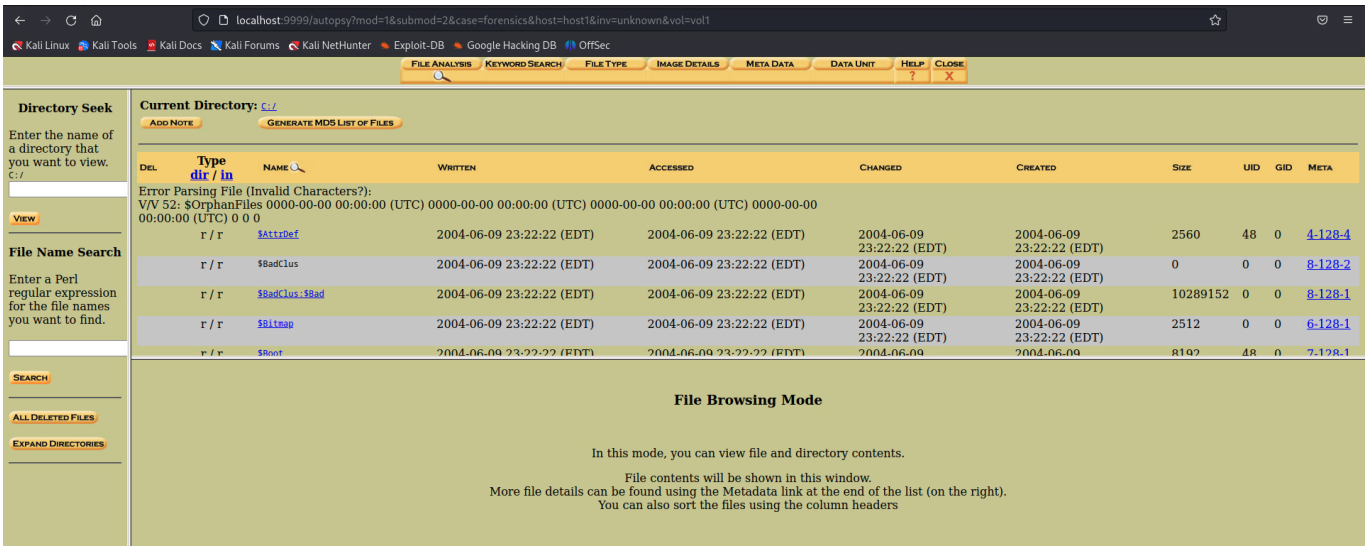


Evidence Recovery

Analysing the image:



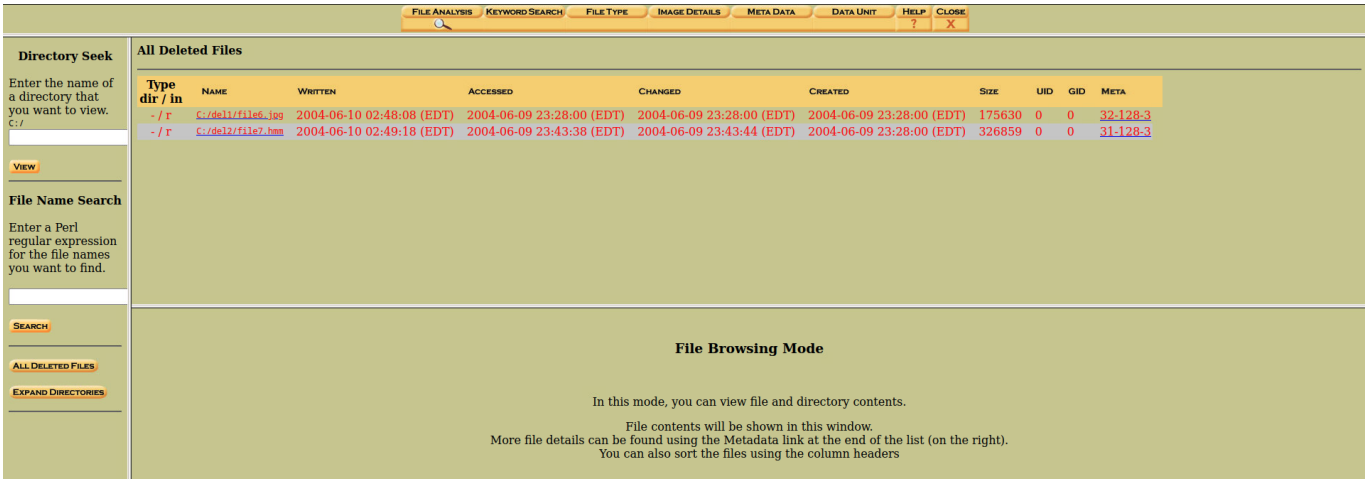
Analyisis succeded:



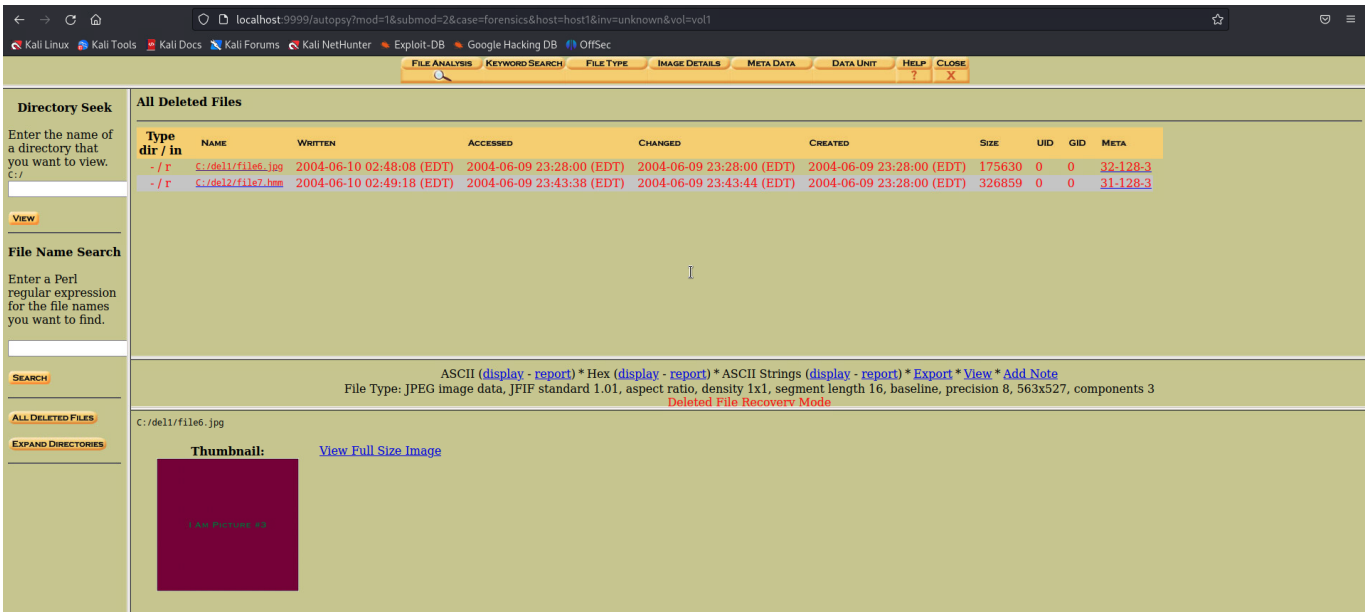
Search for hidden JPG files performed correctly and discovered.

Extraction in deleted files

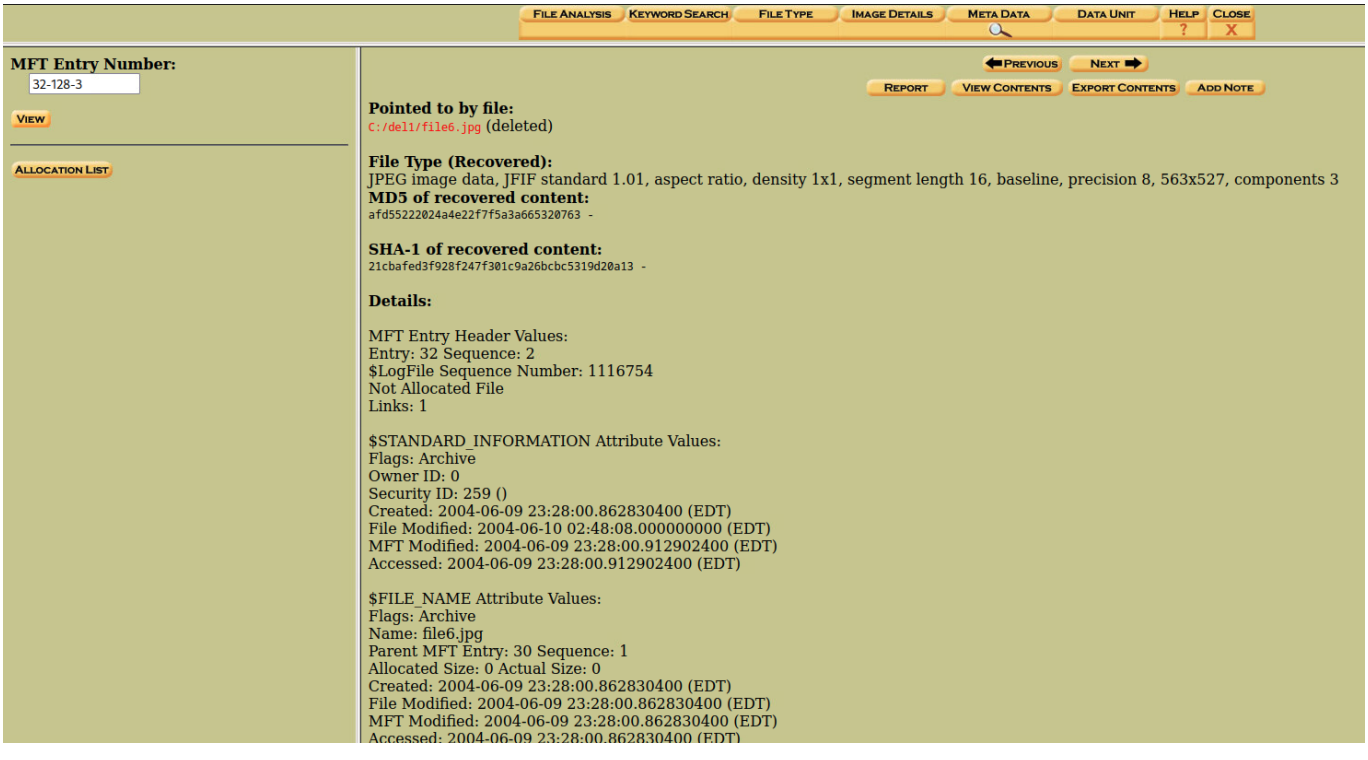
```
All deleted files
>> file6.jpg
>> file7.hmm
```



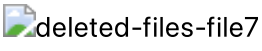

```
>> - /r C:/del1/file6.jpg
```



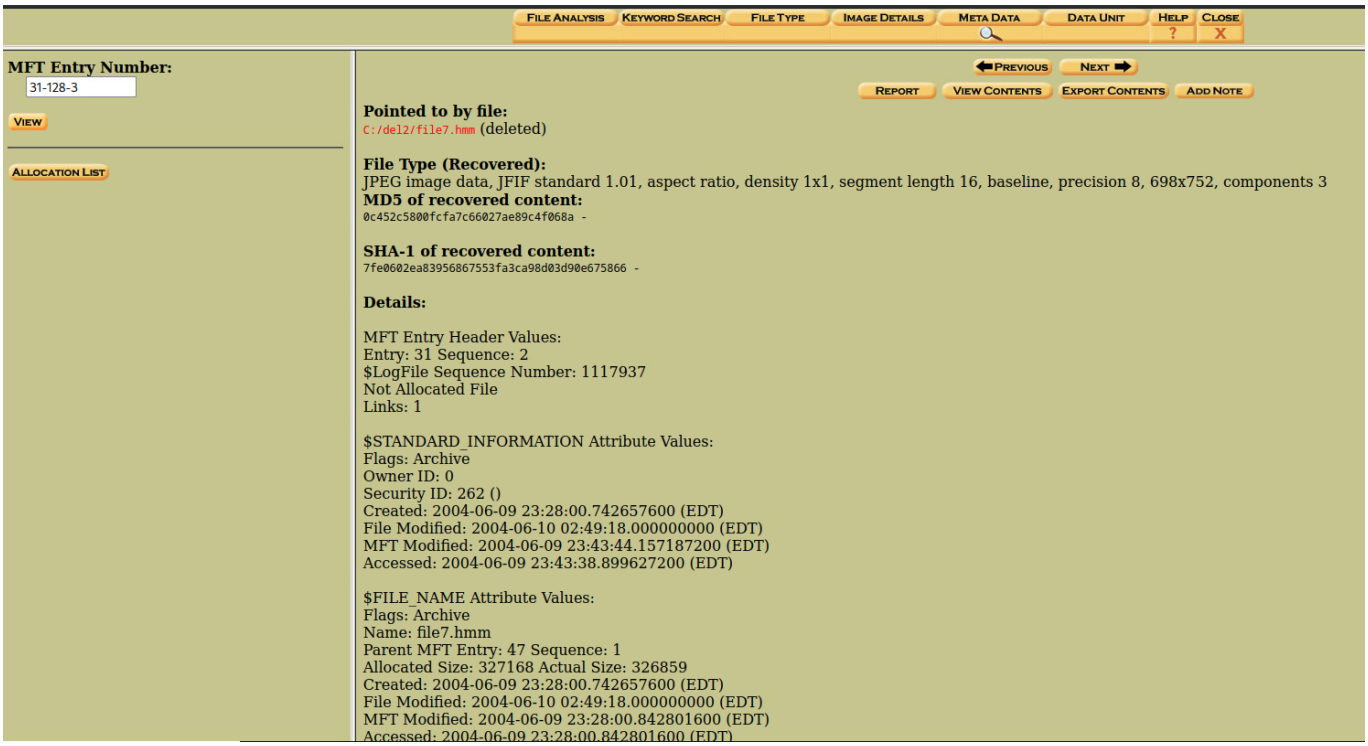
Metadata:




```
>> – /r C:/del1/file7.hmm
```

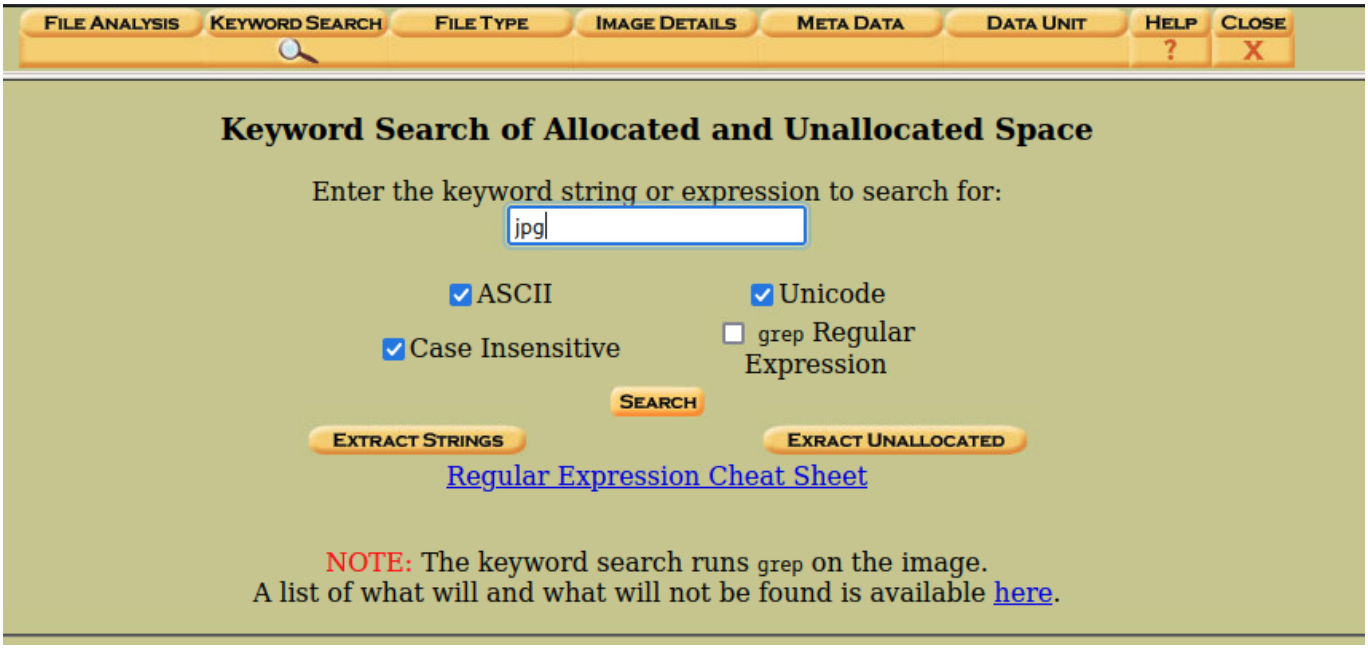


Metadata:



Searching files

Let's search for jpgs:



After checking on the data that was found, we see the following results:

Occurrences of `jpg` were found with search options `ASCII`:

```
1. 451 (*jpg)
>> C:/archive/file10.tar.gz
      Cluster: 10672
      MFT Entry: 38-128-4
2. 36 (ile8.jpgUX)
>> C:/archive/file8.zip
      Cluster: 10810
```

```
      MFT Entry: 39-128-3
3. 417 (ile8.jpgUX)
>> C:/archive/file8.zip
      Cluster: 11464
      MFT Entry: 39-128-3
4. 36 (ile9.jpgUX)
>> C:/archive/file9.boo
      Cluster: 11466
      MFT Entry: 40-128-3
5. 130 (ile9.jpgUX)
>> C:/archive/file9.boo
      Cluster: 12040
      MFT Entry: 40-128-3
```

Occurrences of `jpg` were found with search options `Unicode`:

```
1: 182 (ile1.jpg)
>> C://$LogFile
      Cluster: 2728
      MFT Entry: 2728
2. 30 (ile1.jpg)
>> C://$LogFile
      Cluster: 2729
      MFT Entry: 2-128-1
3. 462 (ile6.jpg)
>> C://$LogFile
      Cluster: 2796
      MFT Entry: 2-128-1
4. 310 (ile6.jpg)
>> C://$LogFile
      Cluster: 2797
      MFT Entry: 2-128-1
5. 214 (ile3.jpg)
>> C://$LogFile
      Cluster: 2857
      MFT Entry: 2-128-1
6. 62 (ile3.jpg)
>> C://$LogFile
      Cluster: 2858
      MFT Entry: 2-128-1
7. 198 (ile4.jpg)
>> C://$LogFile
      Cluster: 2865
      MFT Entry: 2-128-1
8. 46 (ile4.jpg)
>> C://$LogFile
      Cluster: 2866
      MFT Entry: 2-128-1
9. 134 (ile6.jpg)
>> C://$LogFile
      Cluster: 3652
      MFT Entry: 2-128-1
```

```
10. 414 (ile1.jpg)
>> C://$MFT
      Cluster: 6753
      MFT Entry: 0-128-1
11. 254 (ile1.jpg)
>> C://$MFT
      Cluster: 6757
      MFT Entry: 0-128-1
12. 414 (ile6.jpg)
>> C://$MFT
      Cluster: 6759
      MFT Entry: 0-128-1
13. 254 (ile6.jpg)
>> C://$MFT
      Cluster: 6763
      MFT Entry: 0-128-1
14. 414 (ile3.jpg)
>> C://$MFT
      Cluster: 6765
      MFT Entry: 0-128-1
15. 6 (e4.jpg)
>> C://$MFT
      Cluster: 6766
      MFT Entry: 0-128-1
16. 254 (ile3.jpg)
>> C://$MFT
      Cluster: 6769
      MFT Entry: 0-128-1
17. 254 (ile4.jpg)
>> C://$MFT
      Cluster: 6771
      MFT Entry: 0-128-1
18. 240 (ict9.jpg)
>> C:/misc/file12.doc
      Cluster: 12583
      MFT Entry: 43-128-3
19. 0 (ict9.jpg)
>> C:/misc/file12.doc
      Cluster: 12818
      MFT Entry: 43-128-3
20. 300 (ile6.jpg)
>> Inode not found
```

This data gives us the idea of looking up on the following directories:

```
>> C: /archive/
>> C://$LogFile
>> C://$MFT
>> C:/misc/
```

and the following files:

```
>> ile1.jpg
>> ile3.jpg
>> ile4.jpg
>> ile6.jpg
>> ile8.jpgUX

>> e4.jpg
>> ict9.jpg

>> C:/archive/file8.zip
>> C:/archive/file9.boo
>> C:/archive/file10.tar.gz
```

This data gave us compressed with hidden images:

```
1. 451 (*jpg) >> C:/archive/file10.tar.gz
2. 36 (ile8.jpgUX) >> C:/archive/file8.zip
3. 417 (ile8.jpgUX) >> C:/archive/file8.zip
4. 36 (ile9.jpgUX) >> C:/archive/file9.boo
5. 130 (ile9.jpgUX) >> C:/archive/file9.boo
```

Where the attackers are using compressed files (`ZIP`, or `TAR`) to hide images. And the extension `boo` suggests that there is a possible obfuscation. More especifically:

- `file10.tar.gz`: This containes references to `JPG` files with possible objective files.
- `file8.zip`: Appears in multiple clusters and could contain `file.8.jpg`.
- `file9.boo`: Possible intentional obfuscation.

```
>> C://$LogFile
- ile1.jpg (clusters 2728-2729)
- ile6.jpg (clusters 2796-2797)
- ile3.jpg (clusters 2857-2858)
- ile4.jpg (clusters 2865-2866)

>> C://$MFT
- ile1.jpg (clusters 6753, 6757)
- ile6.jpg (clusters 6759, 6763)
- ile3.jpg (clusters 6765, 6769)
- ile4.jpg (clusters 6771)
- e4.jpg (cluster 6766)
```

Where `$LogFile` is the registery file of `NTFS` that shows operations with files. `MTF`: contains metadata of all files. So, the references in `$LogFile`and `$MFT` indicates that those `JPG` existed in the system and were

accessed to or modificated. This will help us to rebuild the timeline of these files.

Also,

```
18. 240 (ict9.jpg) >> C:/misc/file12.doc
19. 0 (ict9.jpg) >> C:/misc/file12.doc
```

indicates that `file12.doc` is a Word document that contains references to `file9.jpg`, this could indicate that it has malicious documents with macros that downloads/opens images.

Finally, the reference

```
20. 300 (ile6.jpg) >> Inode not found
```

Could indicate that the file was deleted, or overwitten, or the file system is corrupted.

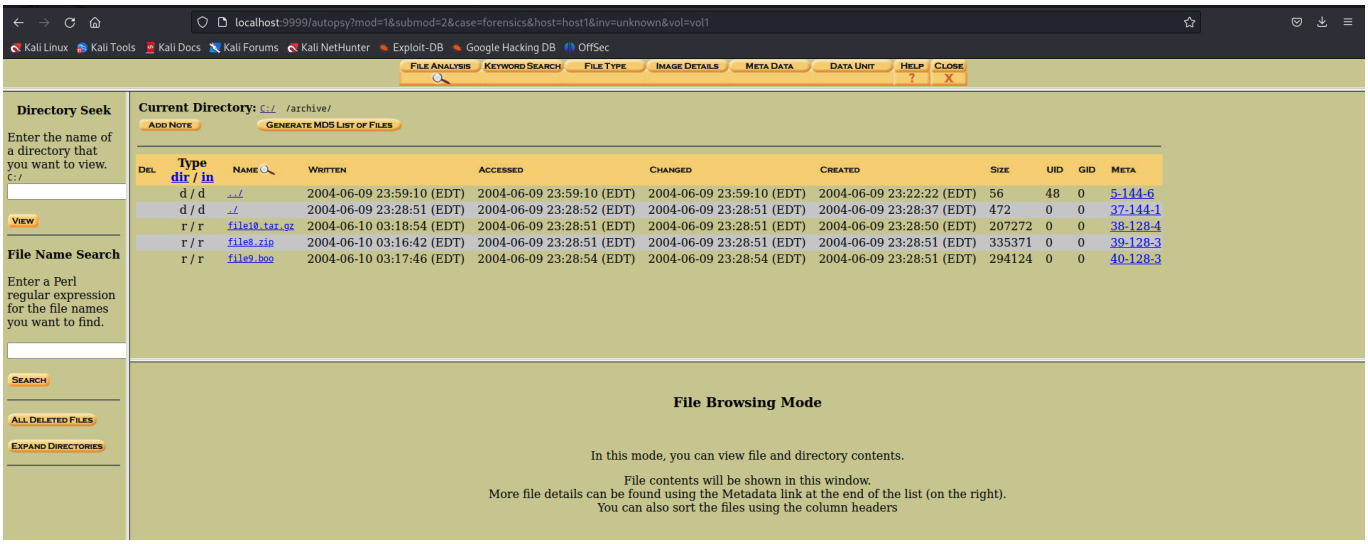
So,

- `file1.jpg` >> references in `$LogFile` and `$MFT`.
- `file3.jpg` >> references in `$LogFile` and `$MFT`.
- `file4.jpg` >> references in `$LogFile` and `$MFT`.
- `file6.jpg` >> references in `$LogFile` and `$MFT`.
- `file8.jpg` >> contained in `file8.zip` and `$MFT`.
- `file9.jpg` >> references in `file12.doc`, and contained in `file9.boo`.
- `file10.jpg` >> possibly contained in `file10.tar.gz`.

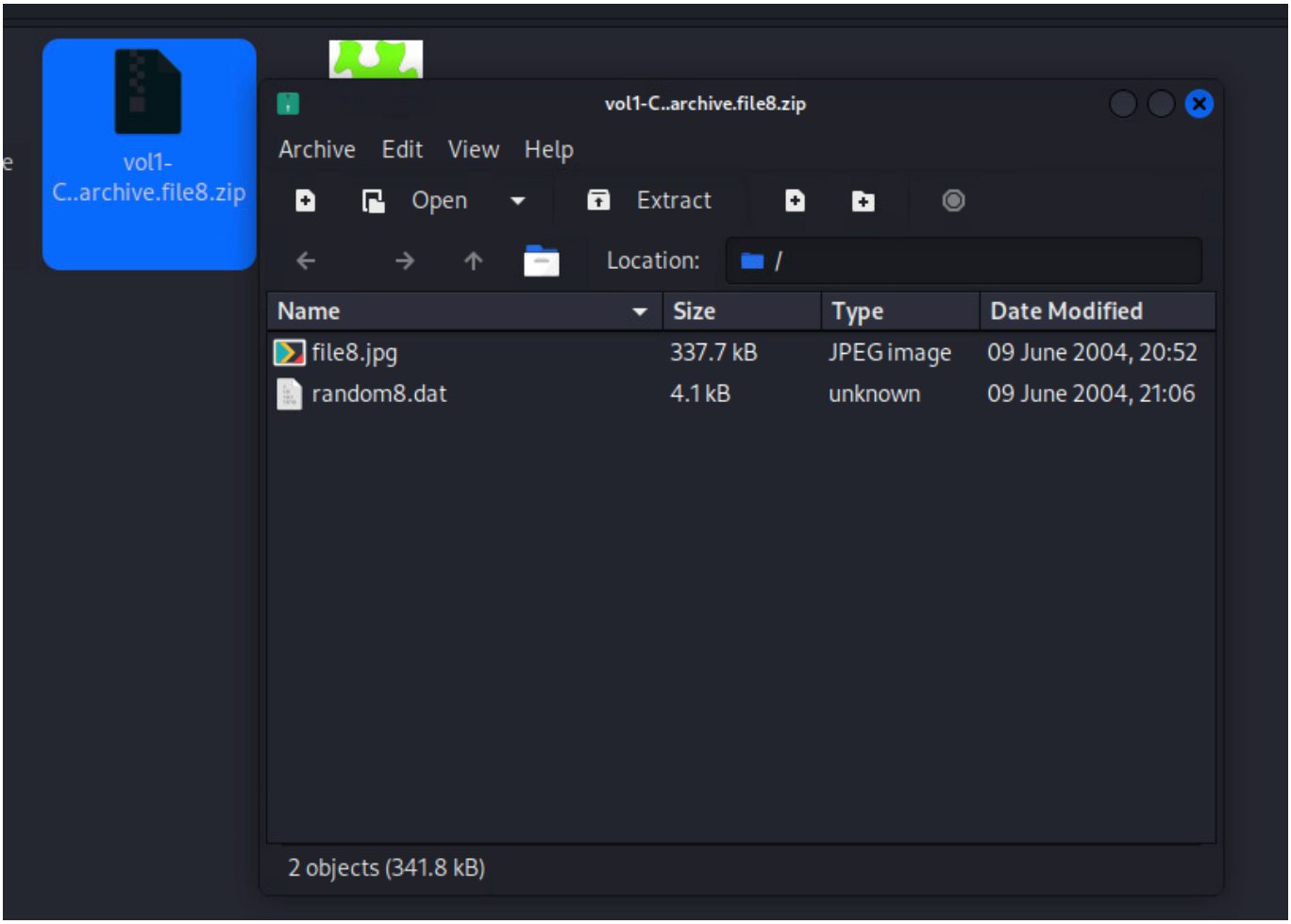
Possibly existed in the system, but we already found `file6.jpg` in deleted files. We need to look for the others.

Extractionn of compressed files in `C://archive/`

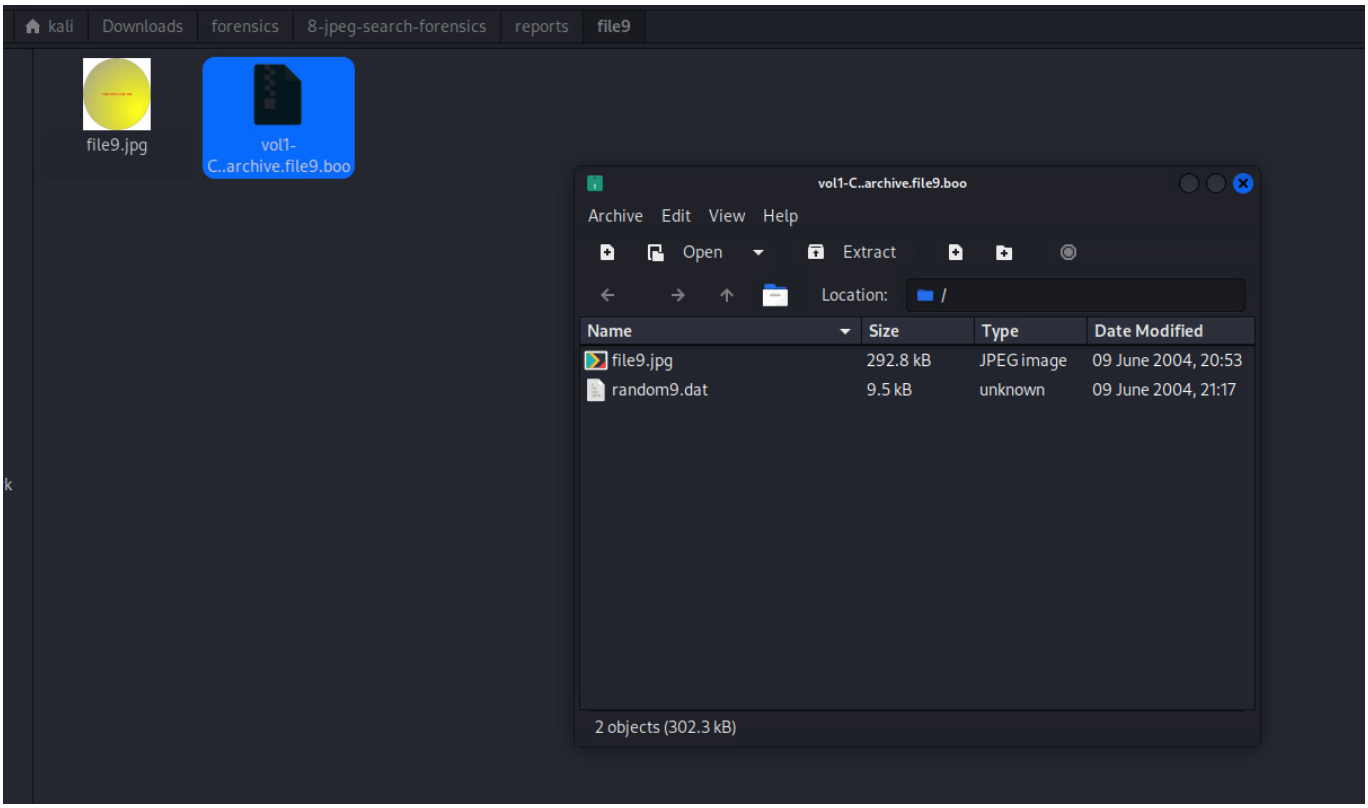
```
>> C://archive/
 - file8.zip
 - file9.boo
 - file10.tar.gz
```



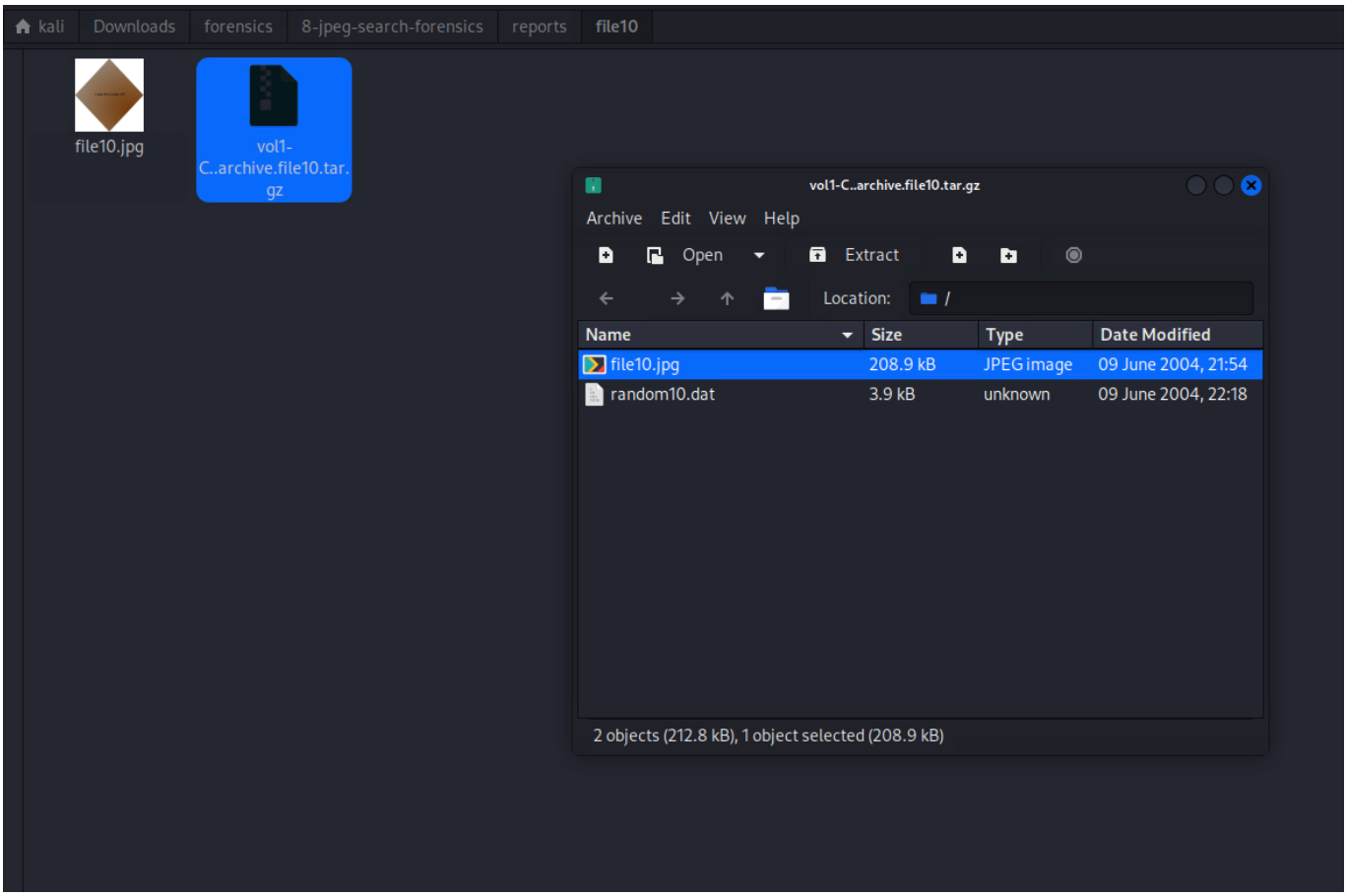

```
>> C://archive/file8.zip
```




```
>> C://archive/file9.boo
```

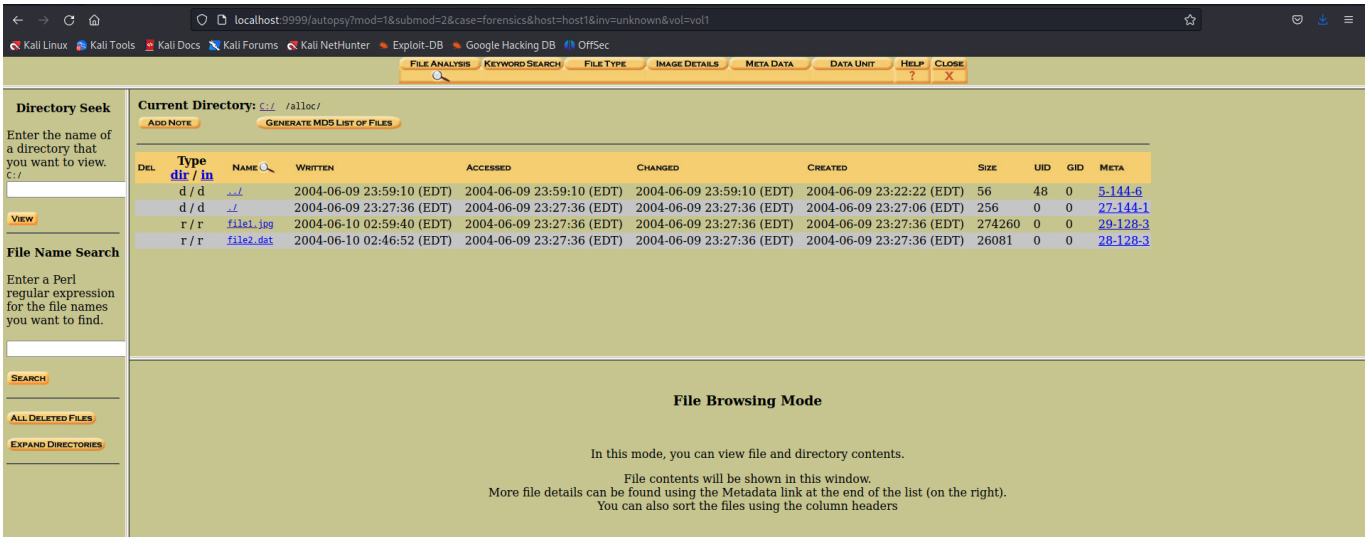



```
>> C://archive/file10.tar.gz
```

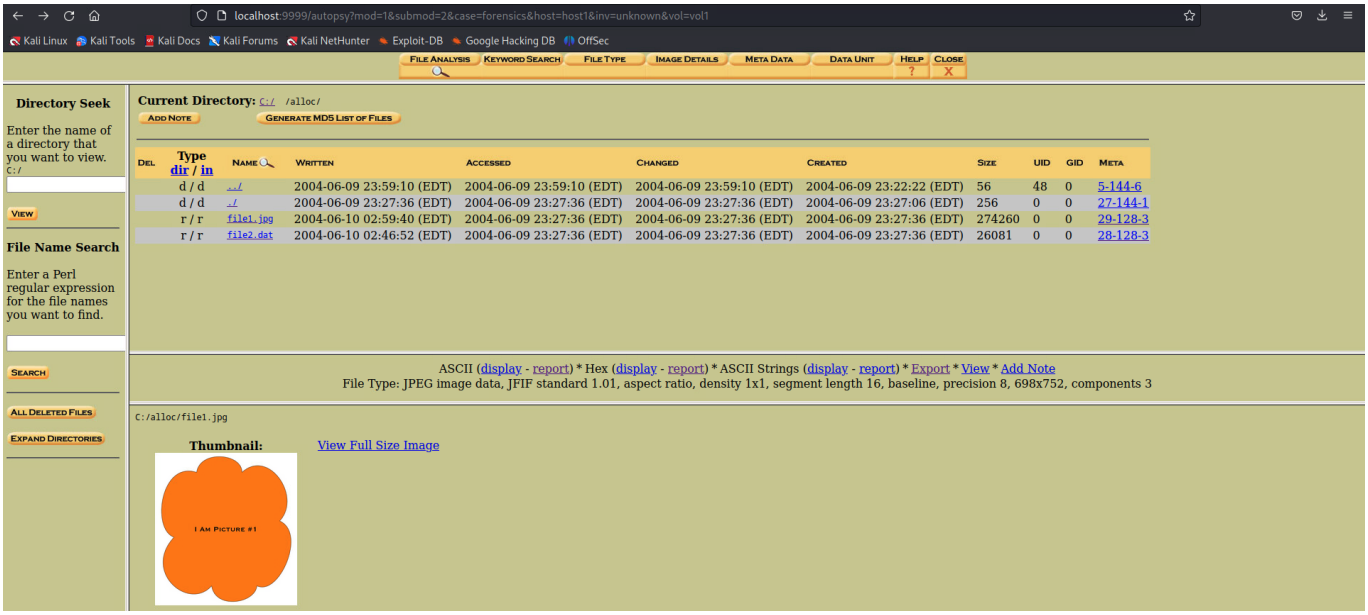


Extractionn of compressed files in `C://alloc/`

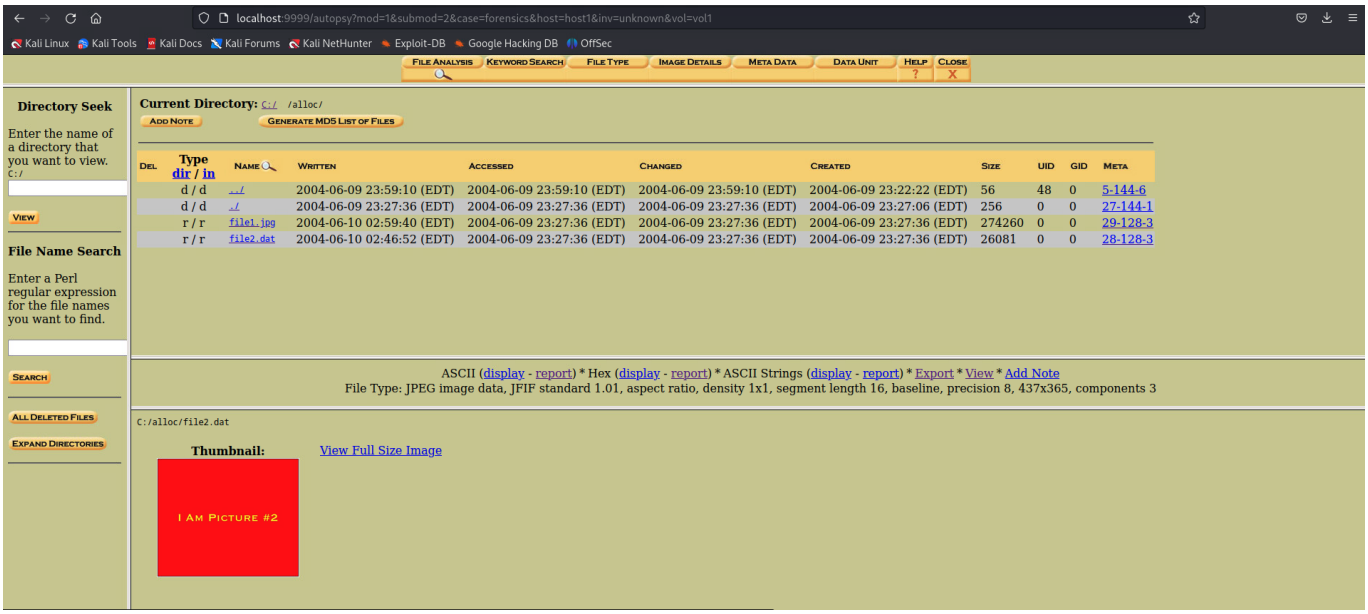
```
>> C://alloc/
 - file1.jpg
 - file2.dat
```




```
>> C://alloc/file1.jpg
```

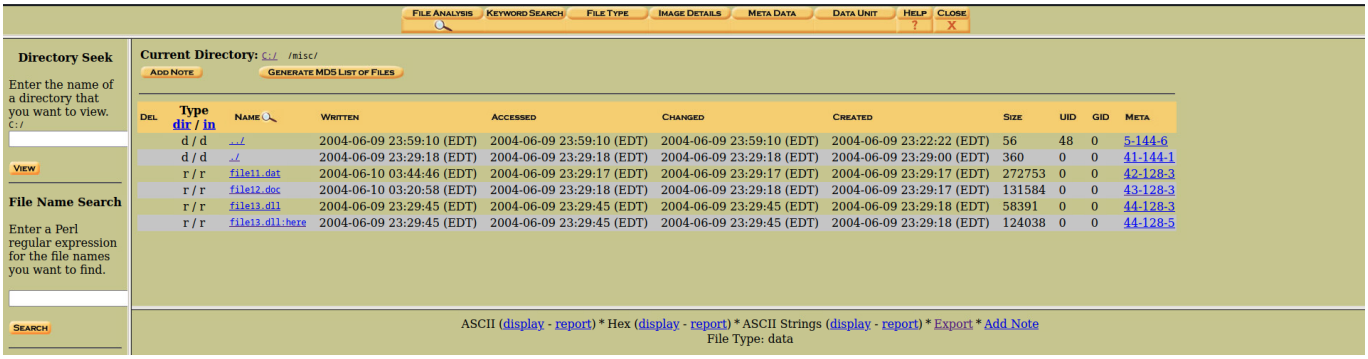



```
>> C://alloc/file2.dat
```

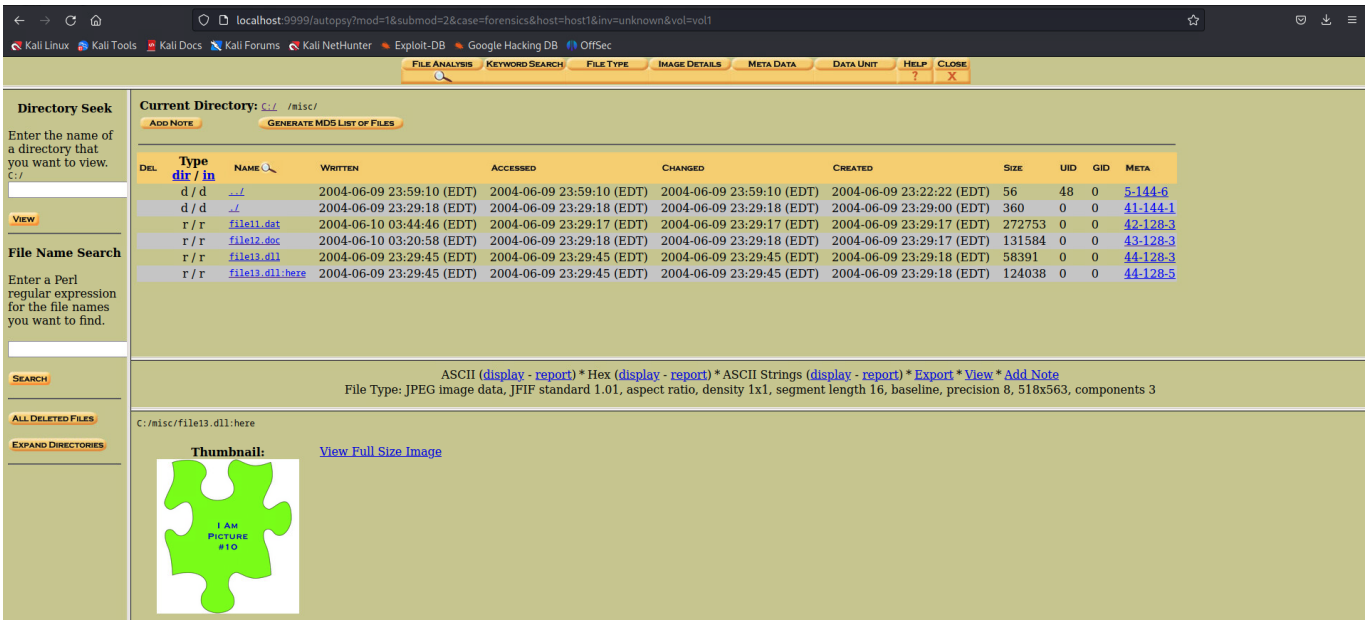


Extractionn of compressed files in `C://misc/`

```
>> C://misc/
 - file12.doc
 - file13.dll:here
```

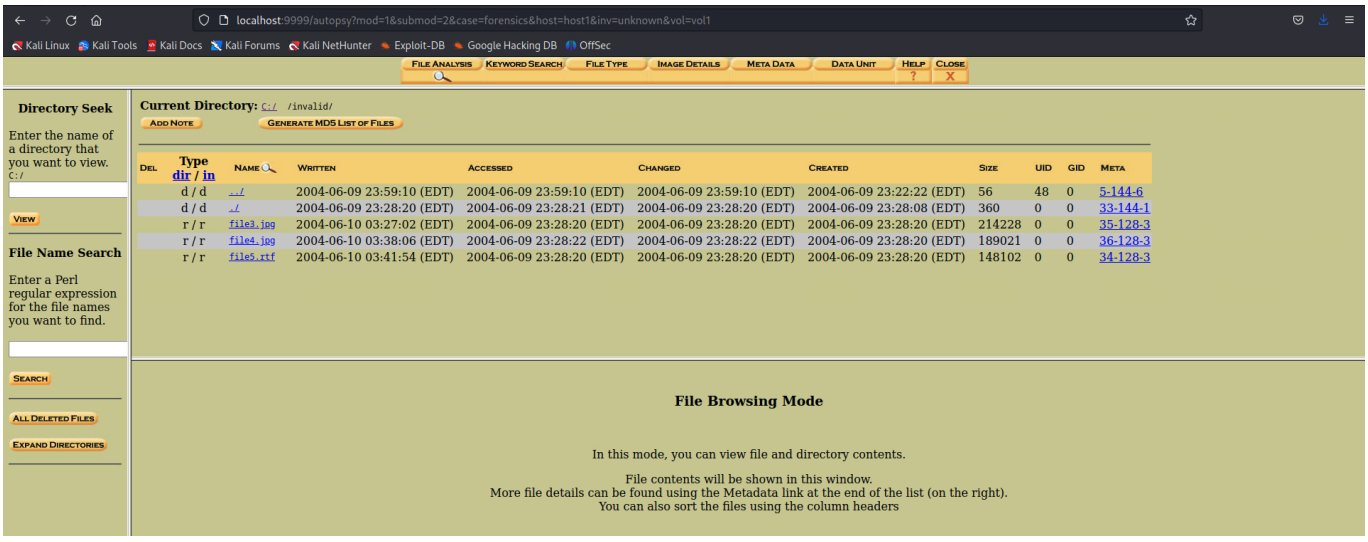



```
>> C://misc/file13.dll:here
```

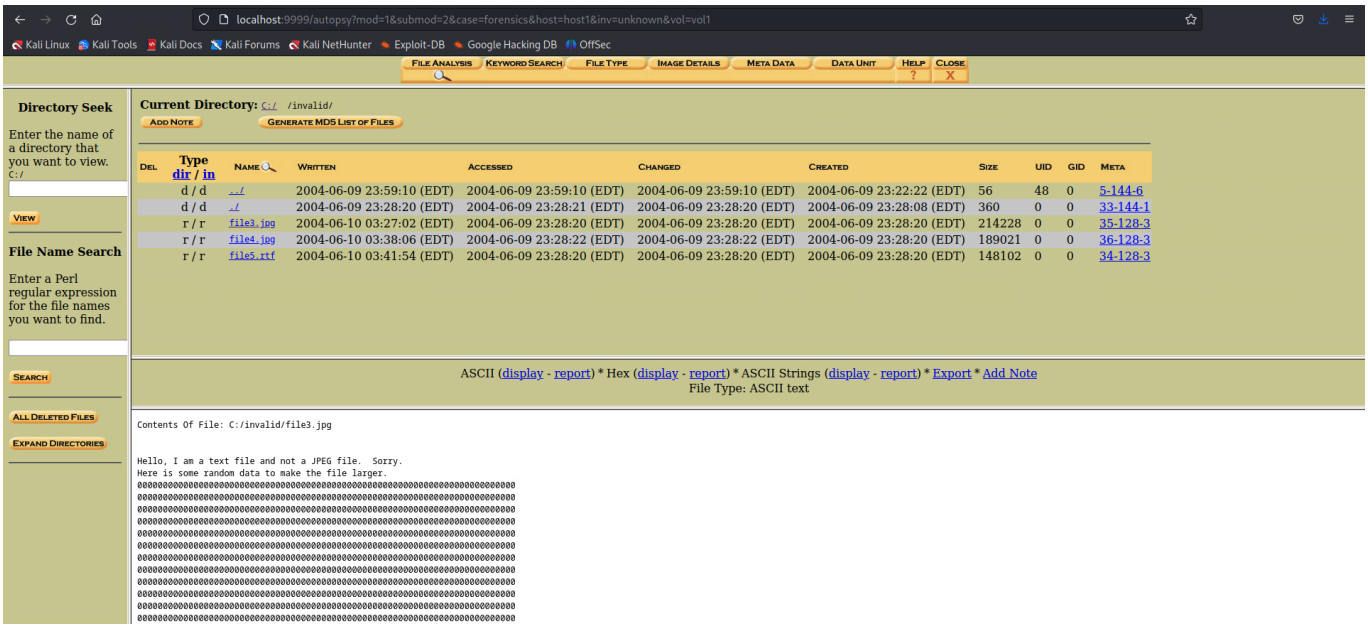


Extractionn of compressed files in `C://invalid/`

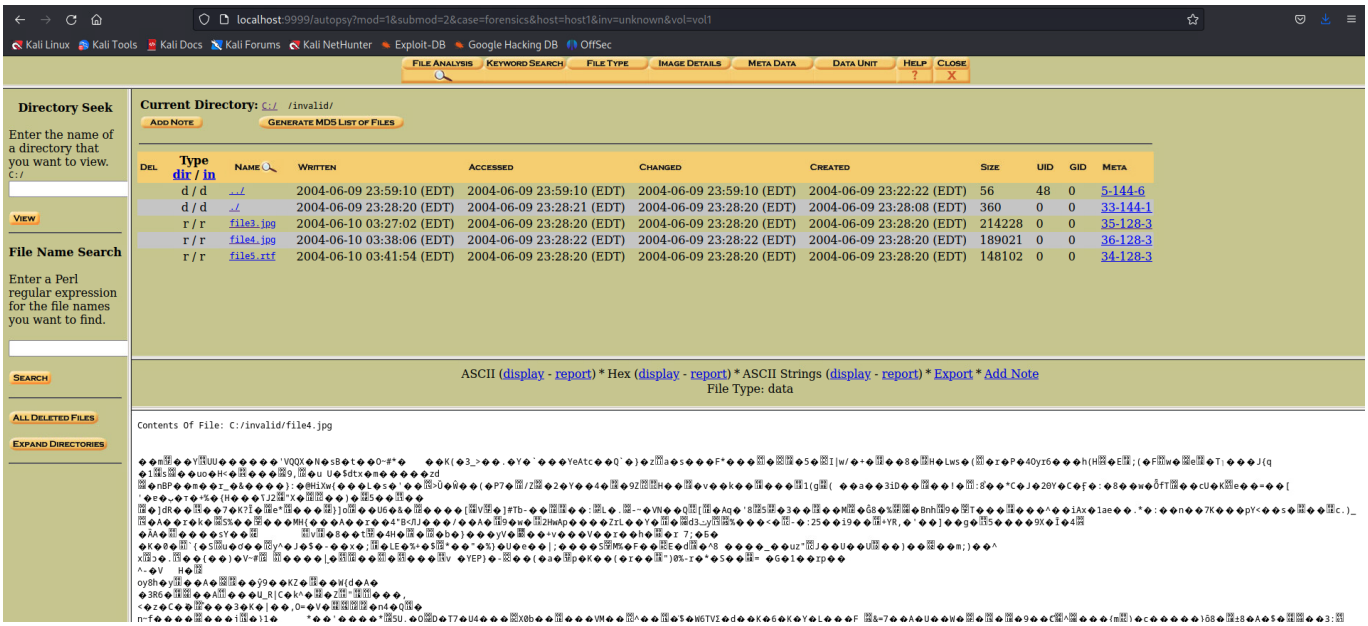
```
>> C://invalid/
  - file3.jpg
  - file4.jpg
  - file5.rtf
```



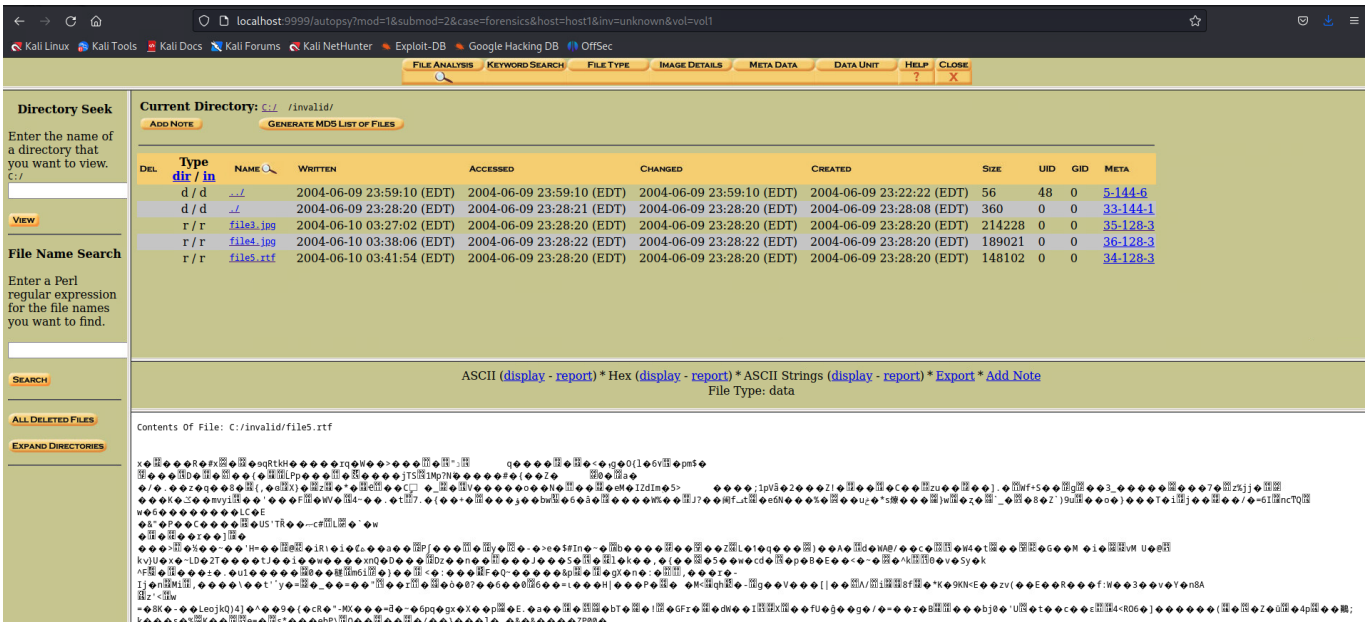

```
>> C://invalid/file3.jpg
```



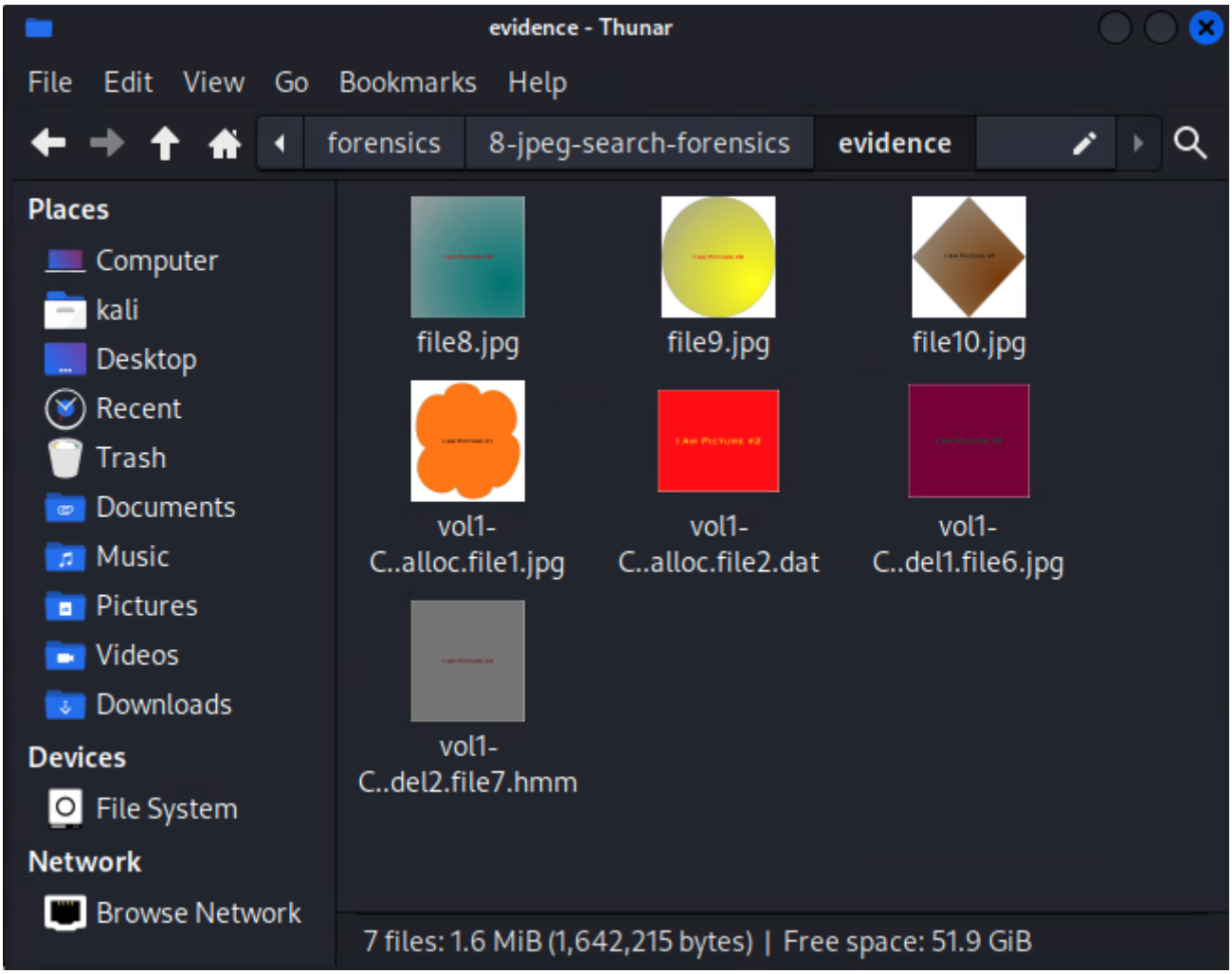

```
>> C://invalid/file4.jpg
```



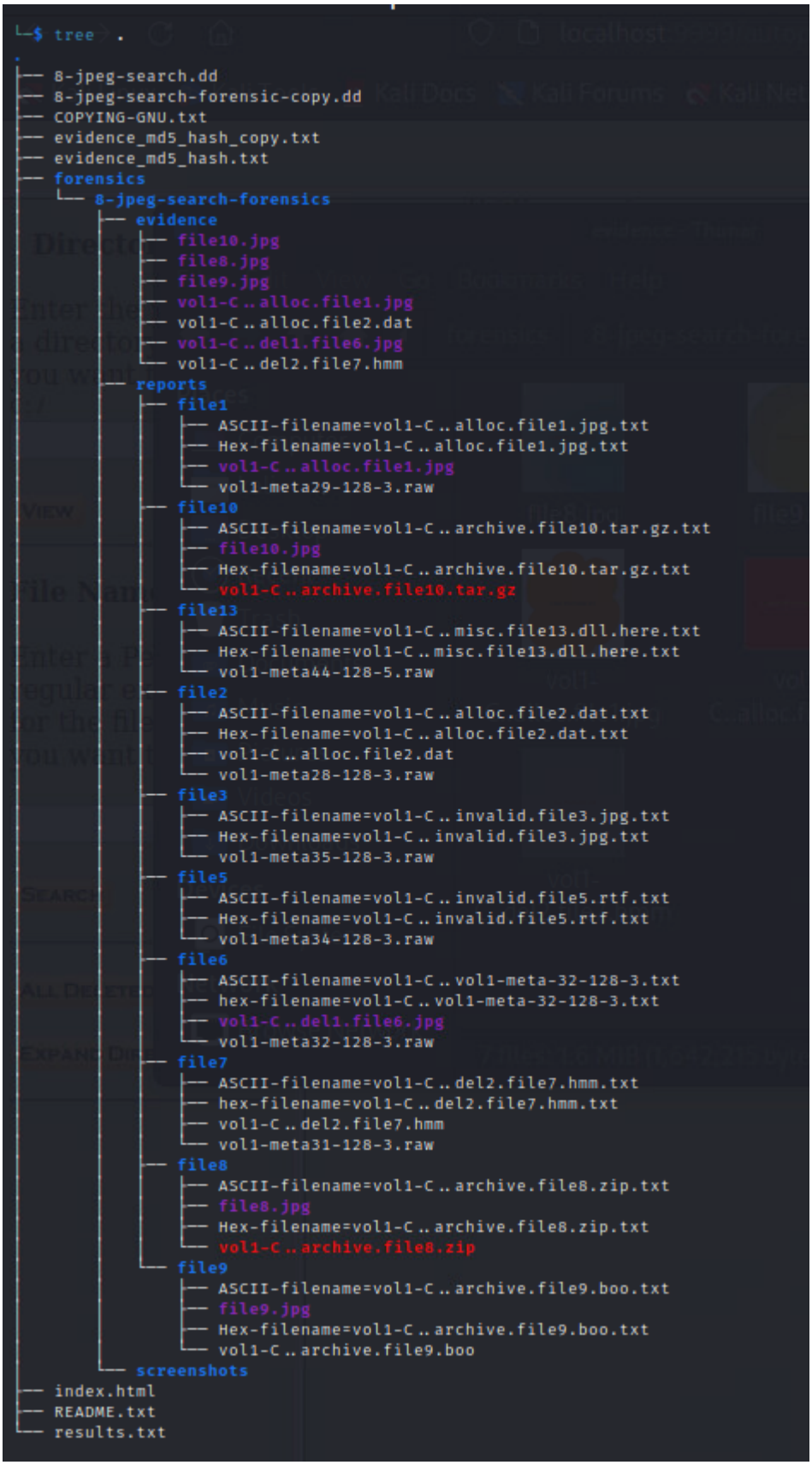

```
>> C://invalid/file5.rtf
```



JPG files recovered.



All the `ASCII` and `Hex` reports may be found in the folder `8-jpeg-search` folder:




```
8-jpeg-search/
├── 8-jpeg-search.dd
├── 8-jpeg-search-forensic-copy.dd
├── COPYING-GNU.txt
├── evidence_md5_hash_copy.txt
├── evidence_md5_hash.txt
└── forensics/
```

```
└── 8-jpeg-search-forensics/
    ├── evidence/
    │   ├── file0.jpg
    │   ├── file8.jpg
    │   ├── file9.jpg
    │   ├── vol1-C..alloc.file1.jpg
    │   ├── vol1-C..alloc.file2.dat
    │   ├── vol1-C..del1.file6.jpg
    │   └── vol1-C..del2.file7.hmm
    └── reports/
        ├── file1/
        │   ├── ASCII-filename=vol1-C..alloc.file1.jpg.txt
        │   ├── Hex-filename=vol1-C..alloc.file1.jpg.txt
        │   ├── vol1-C..archive.file1.jpg
        │   └── vol1-meta29-128-3.raw
        ├── file10/
        │   ├── ASCII-filename=vol1-C..archive.file10.tar.gz.txt
        │   ├── file10.jpg
        │   ├── Hex-filename=vol1-C..archive.file10.tar.gz.txt
        │   └── vol1-C..archive.file10.tar.gz
        ├── files/
        │   ├── ASCII-filename=vol1-C..misc.file13.dll.here.txt
        │   ├── Hex-filename=vol1-C..misc.file13.dll.here.txt
        │   └── vol1-meta44-128-5.raw
        ├── file2/
        │   ├── ASCII-filename=vol1-C..alloc.file2.dat.txt
        │   ├── Hex-filename=vol1-C..alloc.file2.dat.txt
        │   ├── vol1-C..alloc.file2.dat
        │   └── vol1-meta28-128-3.raw
        ├── files/
        │   ├── ASCII-filename=vol1-C..invalid.file3.jpg.txt
        │   ├── Hex-filename=vol1-C..invalid.file3.jpg.txt
        │   └── vol1-meta35-128-3.raw
        ├── file6/
        │   ├── ASCII-filename=vol1-C..invalid.file5.trf.txt
        │   ├── Hex-filename=vol1-C..invalid.file5.trf.txt
        │   └── vol1-meta34-128-3.raw
        ├── file6/
        │   ├── ASCII-filename=vol1-C..vol1-meta-32-128-3.txt
        │   ├── Hex-filename=vol1-C..vol1-meta-32-128-3.txt
        │   ├── vol1-C..del1.file6.jpg
        │   └── vol1-meta32-128-3.raw
        ├── file7/
        │   ├── ASCII-filename=vol1-C..del2.file7.hmm.txt
        │   ├── Hex-filename=vol1-C..del2.file7.hmm.txt
        │   ├── vol1-C..del2.file7.hmm
        │   └── vol1-meta31-128-3.raw
        ├── files/
        │   ├── ASCII-filename=vol1-C..archive.file8.zip.txt
        │   ├── Hex-filename=vol1-C..archive.file8.zip.txt
        │   └── vol1-C..archive.file8.zip
        └── file9/
            ├── ASCII-filename=vol1-C..archive.file9.b00.txt
```

```
                    ├── Hex-filename=vol1-C..archive.file9.b00.txt
                    └── vol1-C..archive.file9.b00
```

Findings Summary:

Files	Origina location	State
`file1.jpg`	`C:\alloc\`	Recovered from assigned space
`file2.dat`	`C:\alloc\`	Recovered (extension `dat`) - possible `jpg` renamed
`file3.jpg`	`C:\invalid\`	Marked as "invalid" - damaged/corrupted format
`file4.jpg`	Not found	Unexistent, overwritten or obfuscated file
`file5.trf`	`C:\invalid\`	Extension `.trf` - unknown format
`file6.jpg`	`C:\del1\`	Recovered from deleted space
`file7.hmm`	`C:\del2\`	Recovered (extension`hmm`) - unknown format
`file8.zip`	`C:\archive\`	Contains `file8.jpg`
`file9.boo`	`C:\archive\`	Contains `file9.jpg` (obfuscated extension)
`file10.tar.gz`	`C:\archive\`	Contains `file10.jpg`
`file13.dll.here`	`C:\misc\`	Suspicious `dll` file - suspicious executable file