Protect your data, protect your life.

Data Destruction Day

CIRCL
Computer Incident
Response Center
Luxembourg

Michael Hamm - *TLP:GREEN*

info@circl.lu

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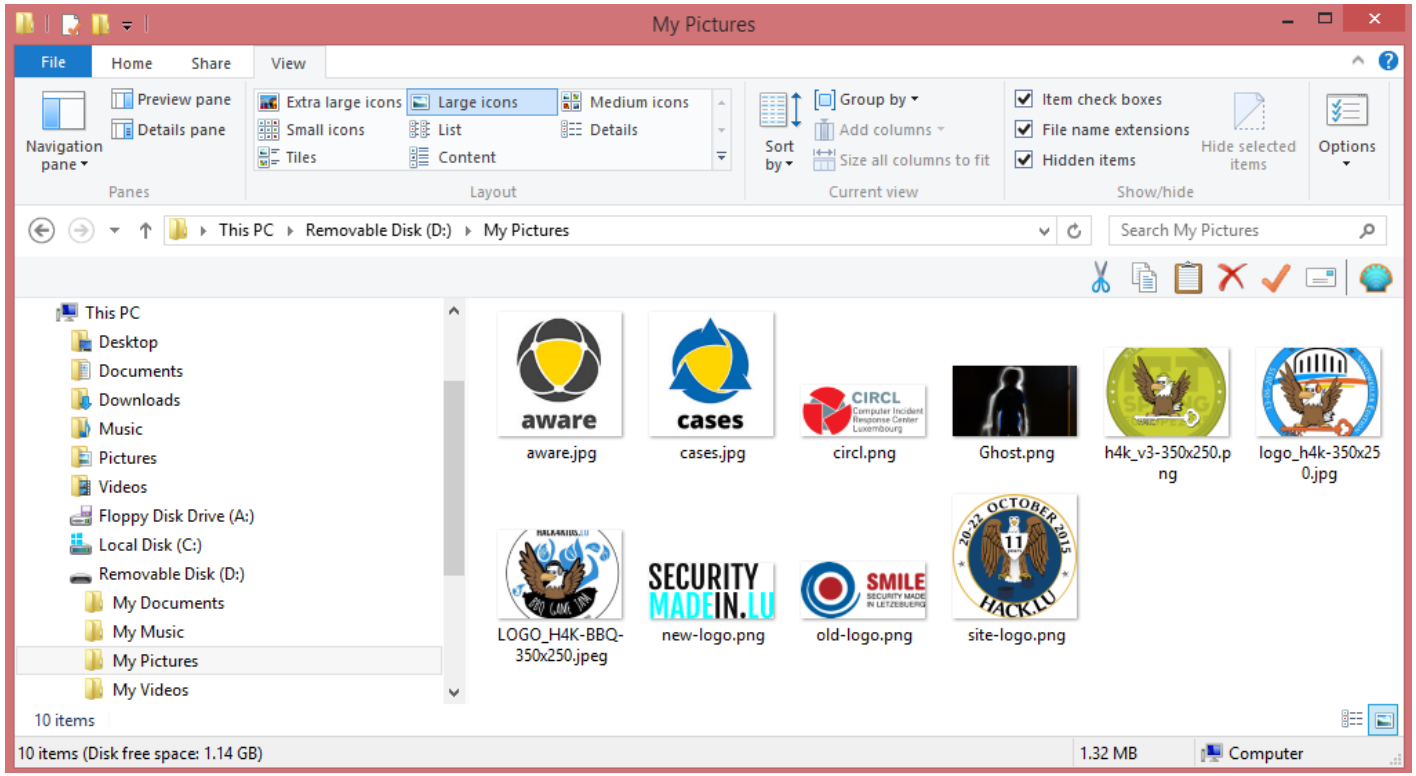
Your data is important ...

- Pictures / Movies $\rightarrow$ it's your life
- Private and business emails $\rightarrow$ it's your job
- Documents $\rightarrow$ it's your information
- Passwords and credentials $\rightarrow$ it's your security
- Online Banking $\rightarrow$ it's your money

$\rightarrow$ ... more important than you may imagin!

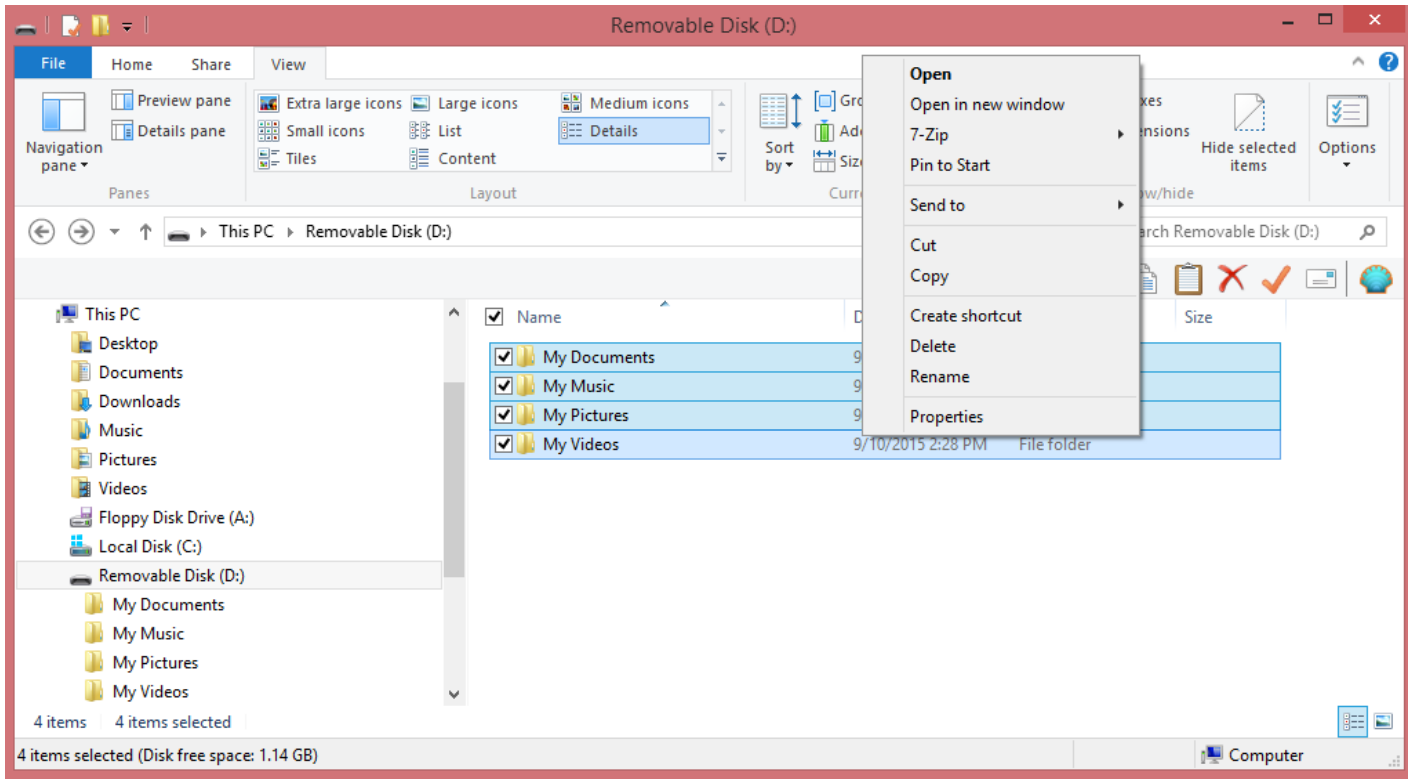
Delete all files

- 1. Connect drive



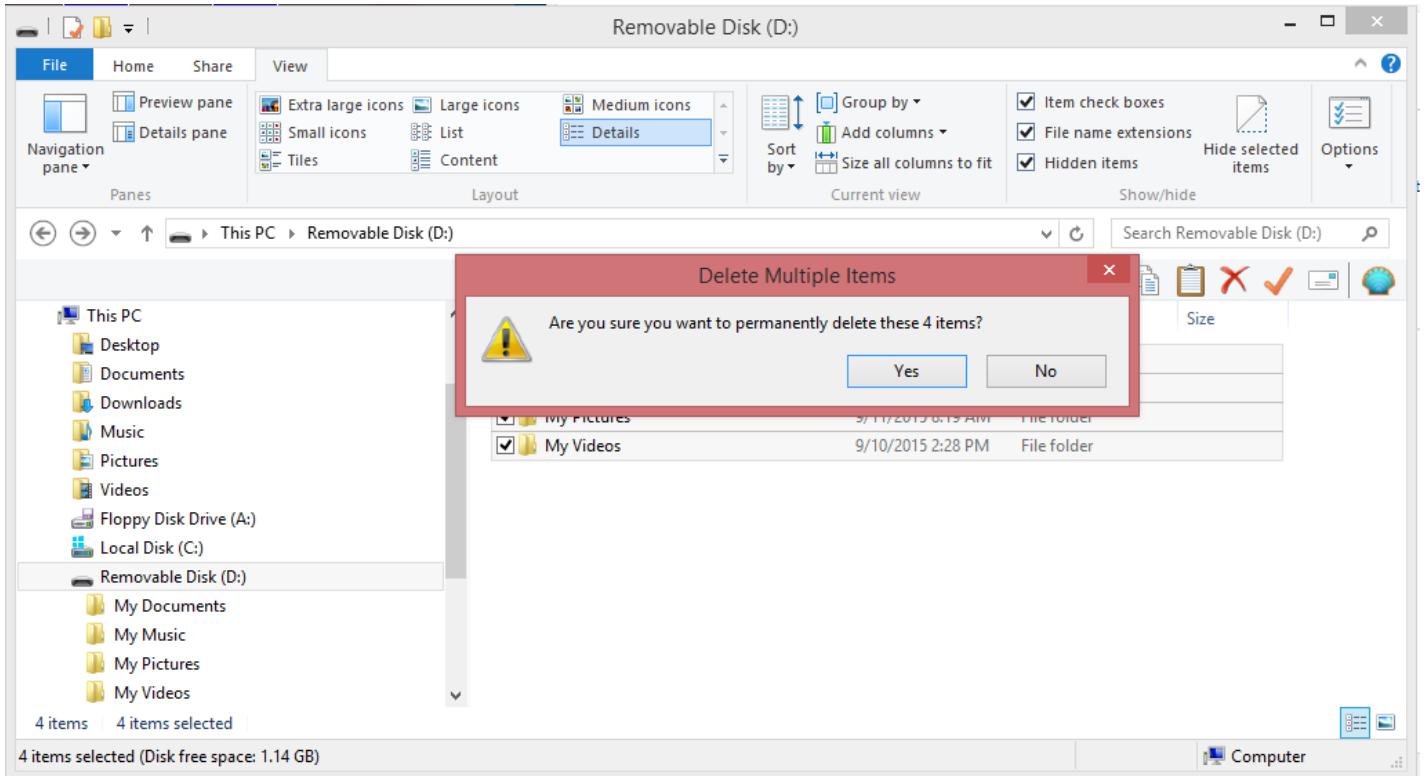
Delete all files

- 2. Select all files to delete



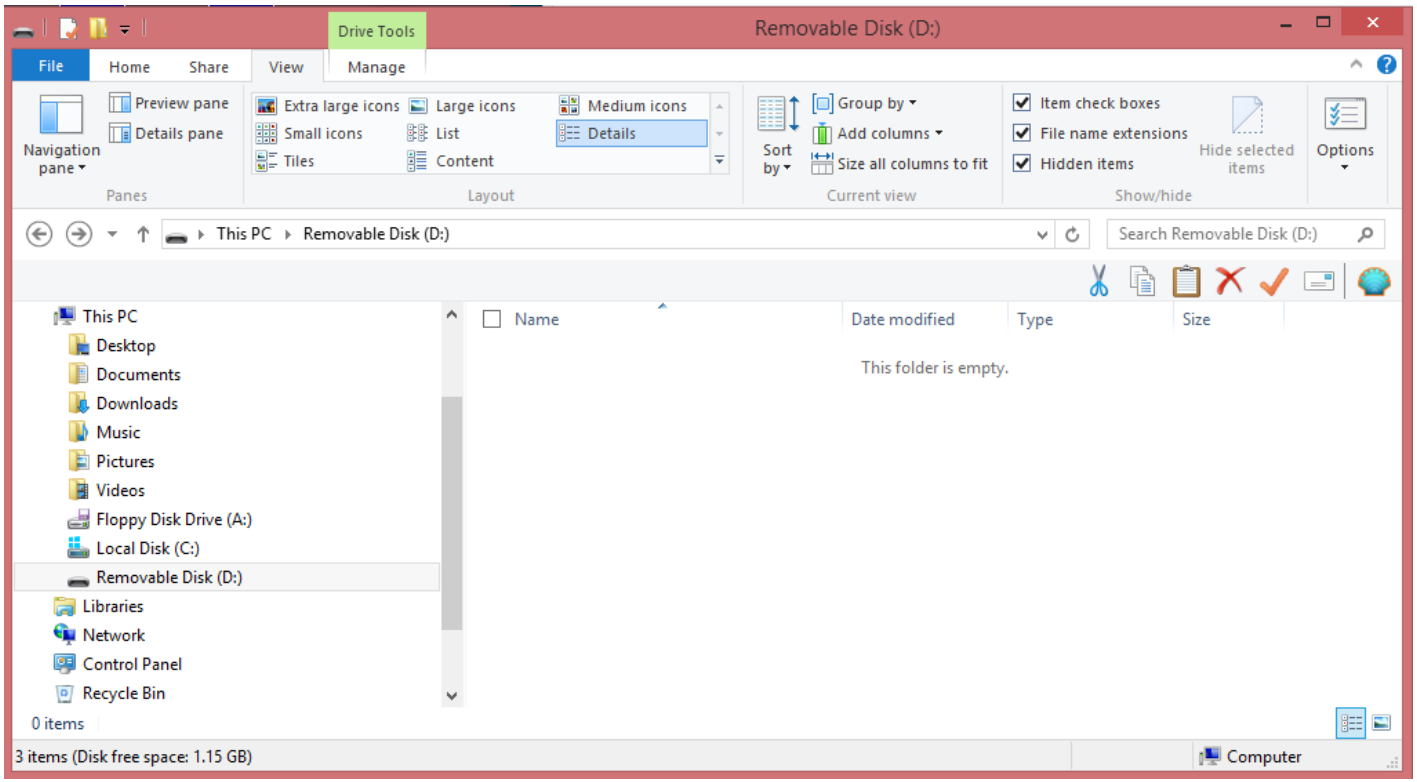
Delete all files

- 3. Confirm to delete all files



Delete all files

- 4. All files are now deleted



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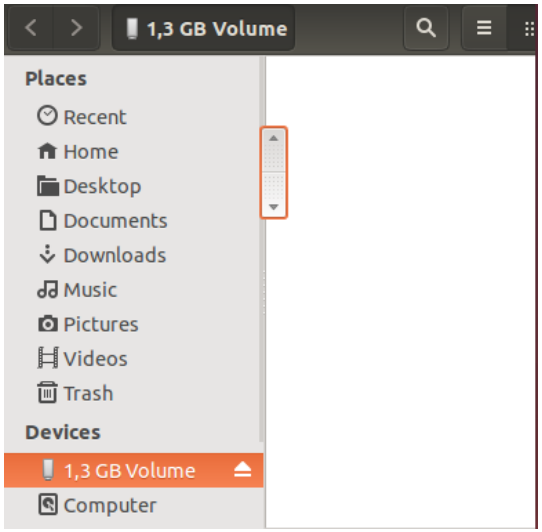
- Live exercise: Deleted files

  → Can we restore some files?

  → We connect the device with the deleted files:



  → Looks empty!

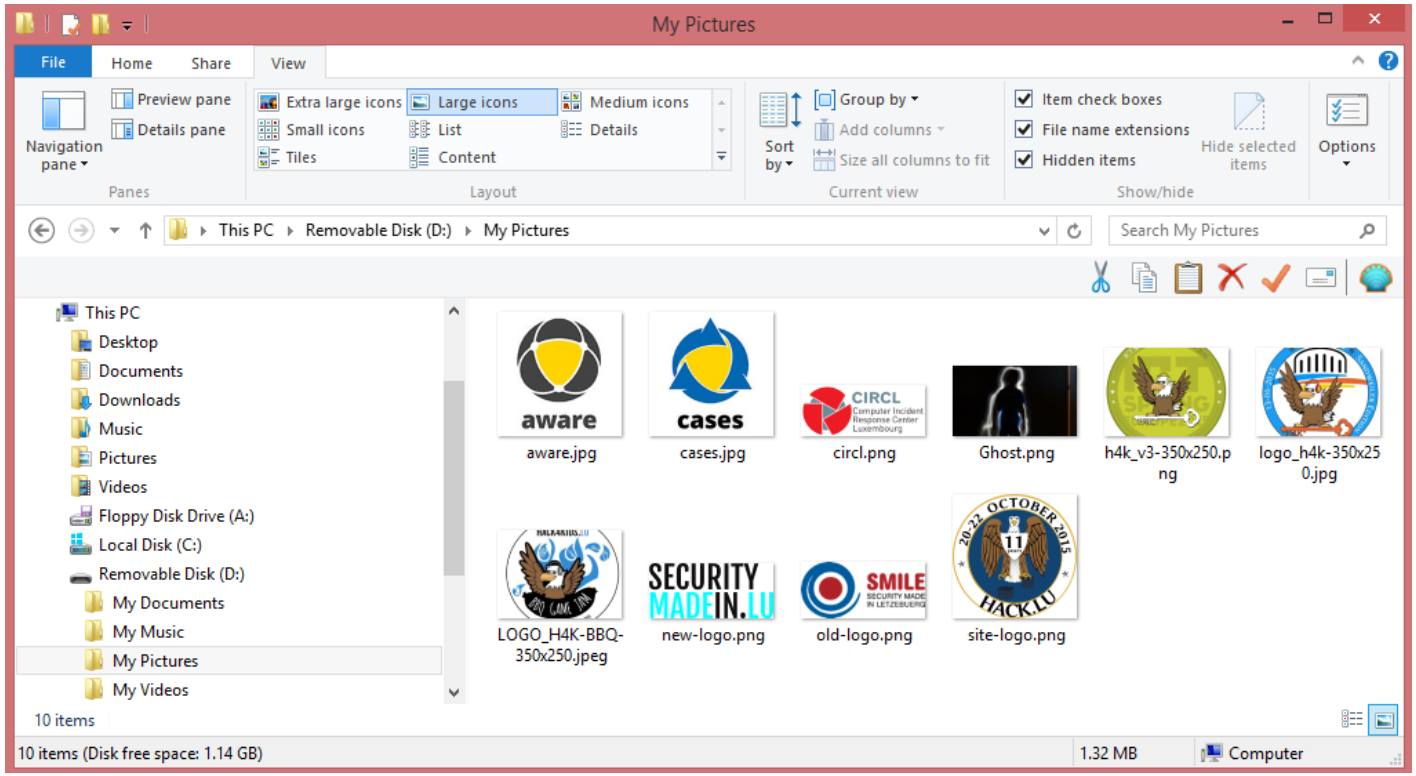
Live exercise: Deleted files

```
$ dmesg
...
...
[88758.591351]  sdb: sdb1
[88758.592677] sd 18:0:0:0: [sdb] No Caching mode page found
[88758.592680] sd 18:0:0:0: [sdb] Assuming drive cache: write through
[88758.592681] sd 18:0:0:0: [sdb] Attached SCSI removable disk
```

```
$ sudo fls -m / -r /dev/sdb1 > body.txt
$ mactime -b body.txt | less
...
...
Fri Sep 11 2015 10:13:31  980502 m.cb  48  70-128-2 /My Pictures/Ghost.png (deleted)
Fri Sep 11 2015 10:13:56   36047 m.cb  48  71-128-2 /My Pictures/logo_h4k-350x250.jpg (deleted)
Fri Sep 11 2015 10:14:10   32286 m.cb  48  72-128-2 /My Pictures/LOGO_H4K-BBQ-350x250.jpeg (deleted)
...
...
Fri Sep 11 2015 10:16:56   12071 m.cb  48  75-128-2 /My Pictures/circl.png (deleted)
Fri Sep 11 2015 10:18:34    5948 m.cb  48  76-128-2 /My Pictures/cases.jpg (deleted)
Fri Sep 11 2015 10:18:47    5314 m.cb  48  77-128-2 /My Pictures/aware.jpg (deleted)
...
...
```

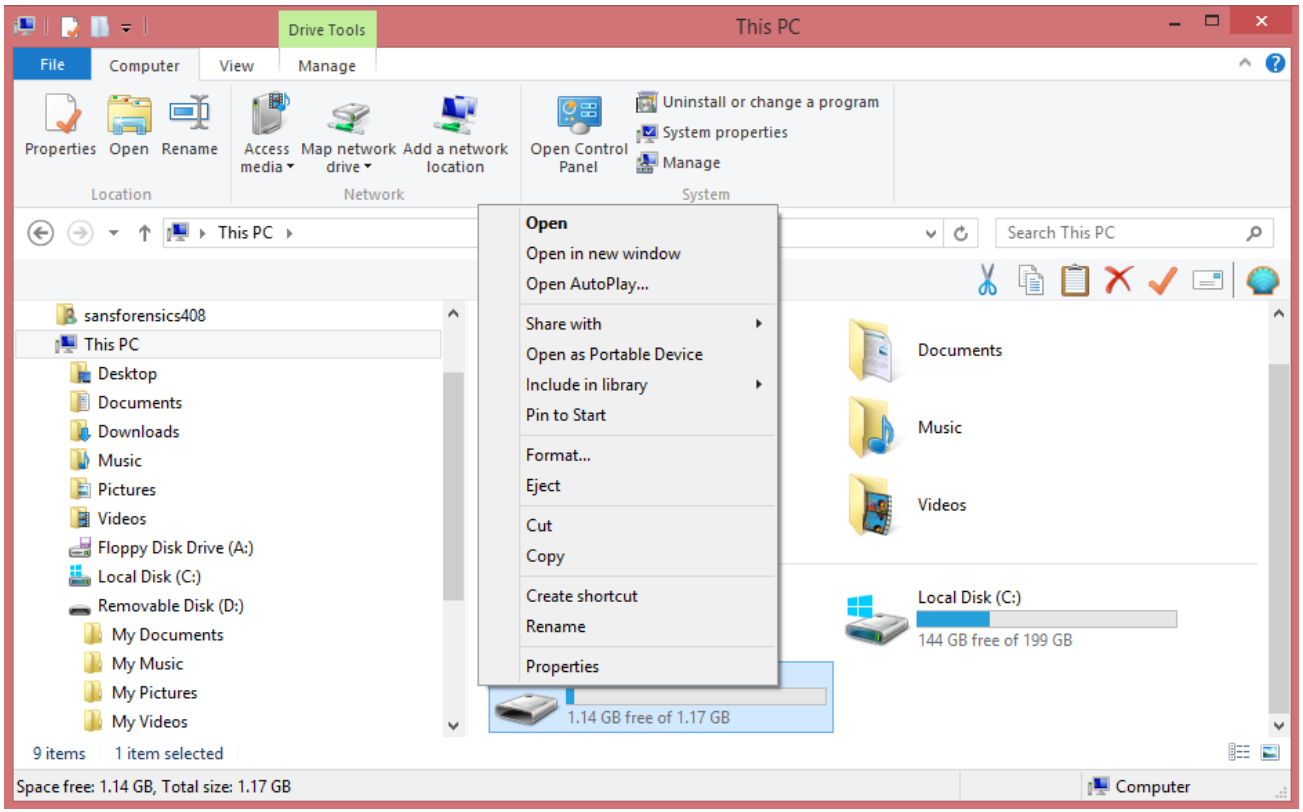
Format hard drive

- 1. Connect drive



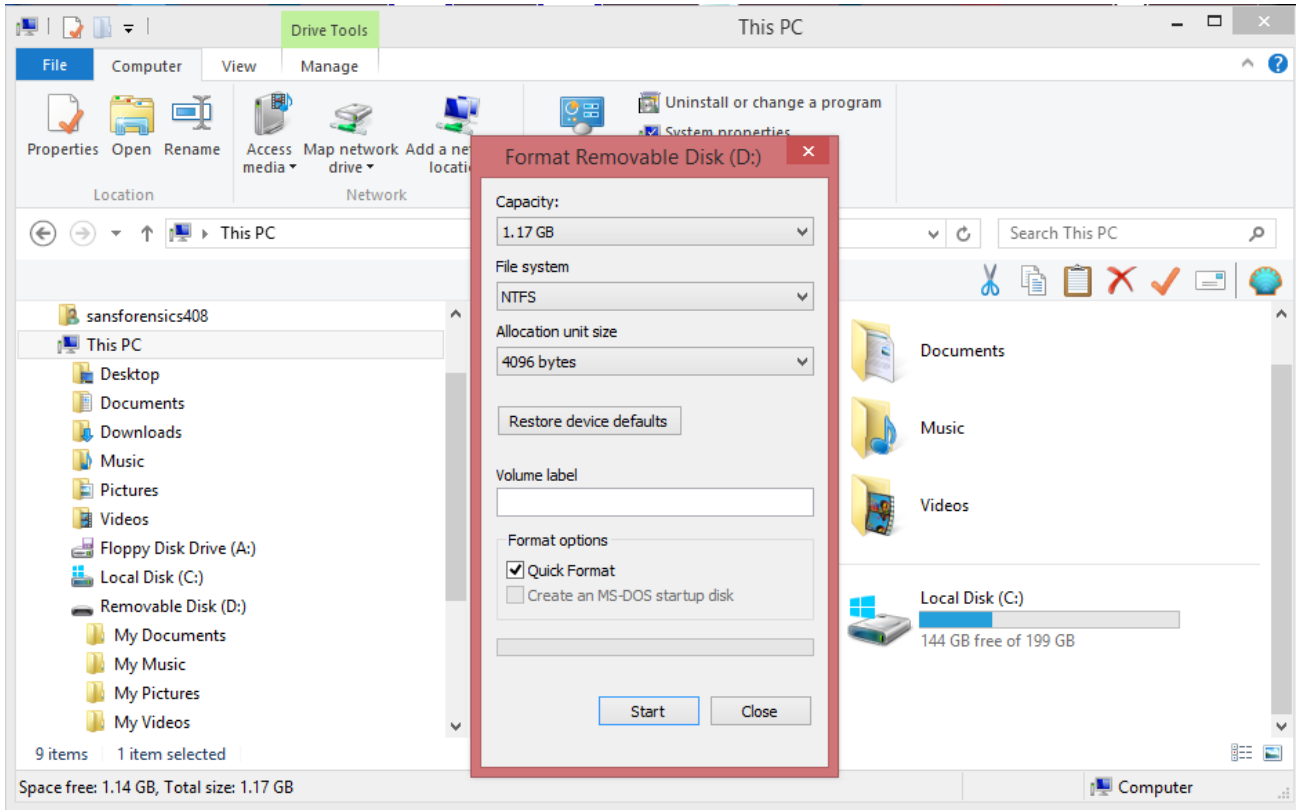
Format hard drive

- 2. Select drive to be formatted



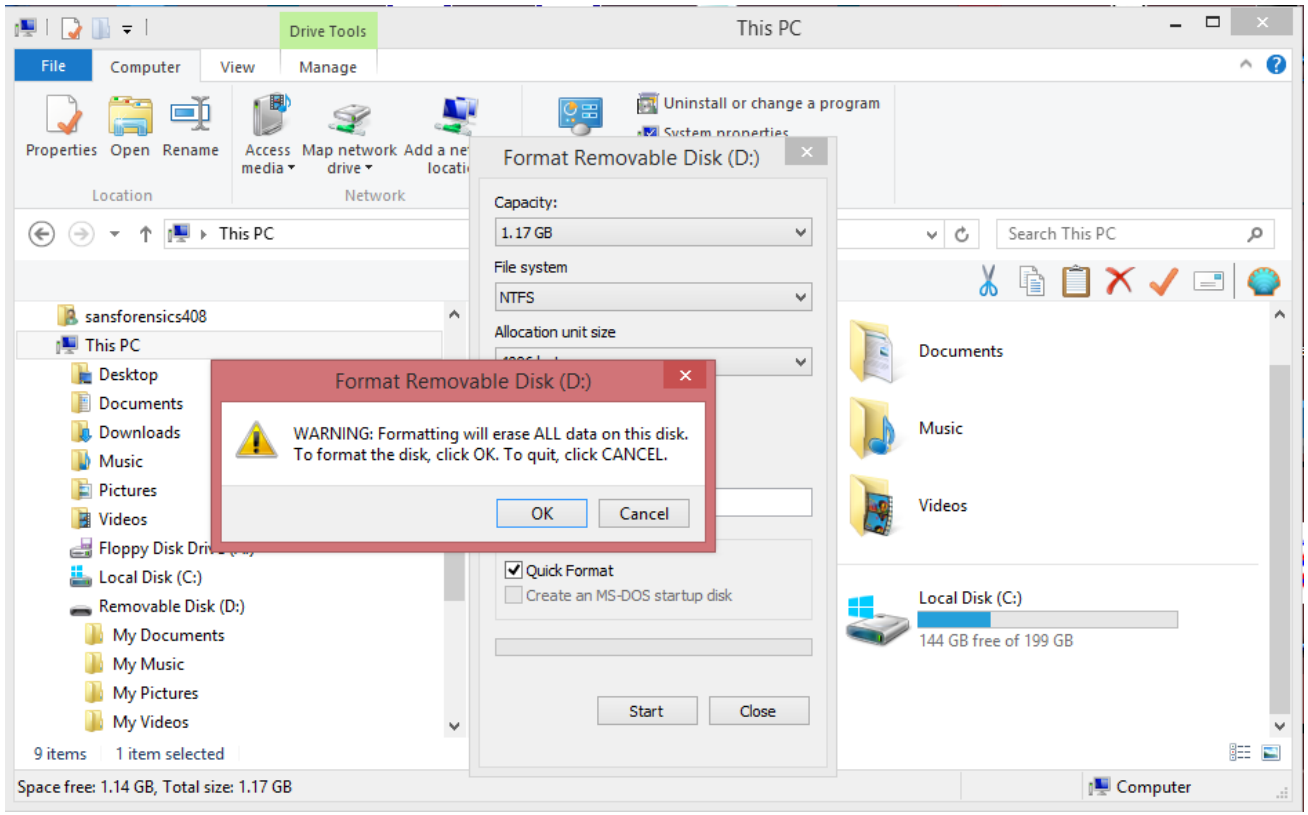
Format hard drive

- 3. Format drive



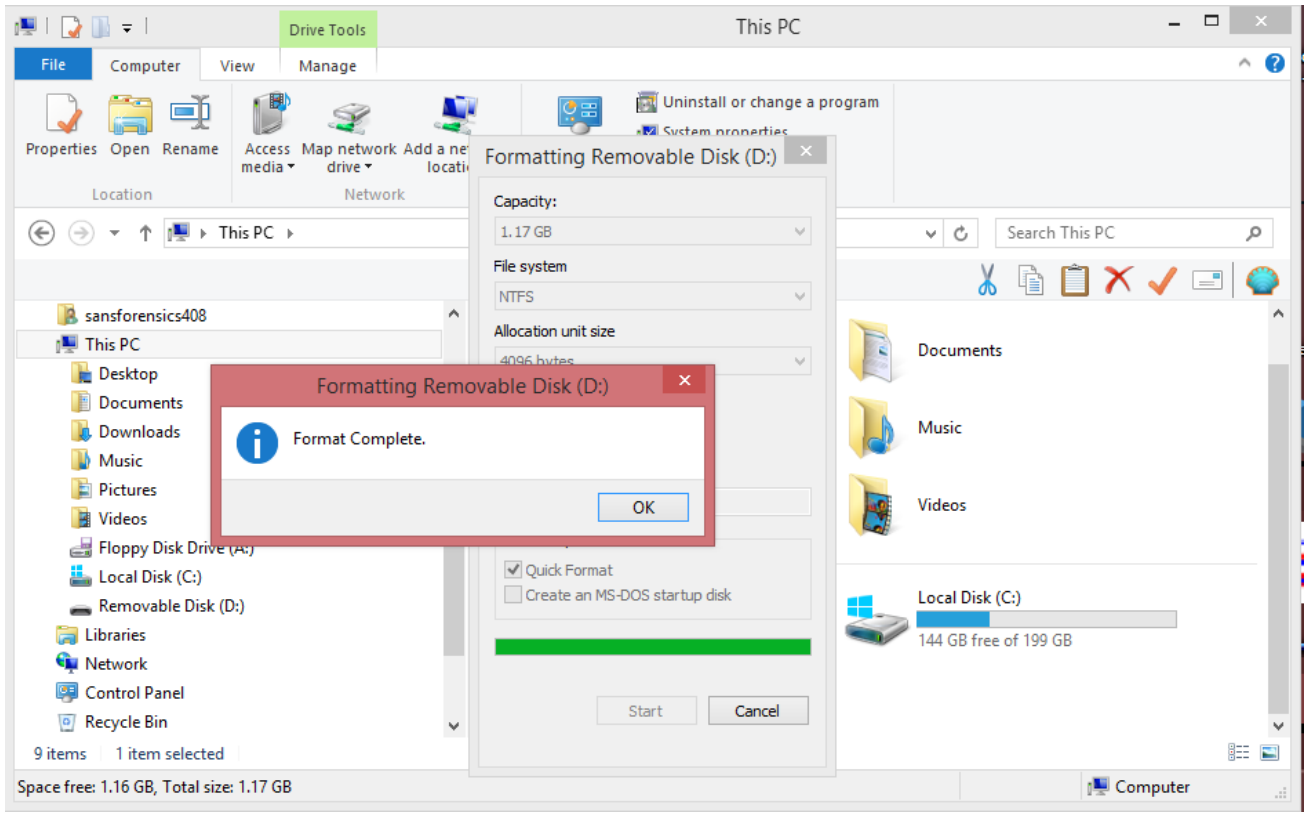
Format hard drive

- 4. WARNING



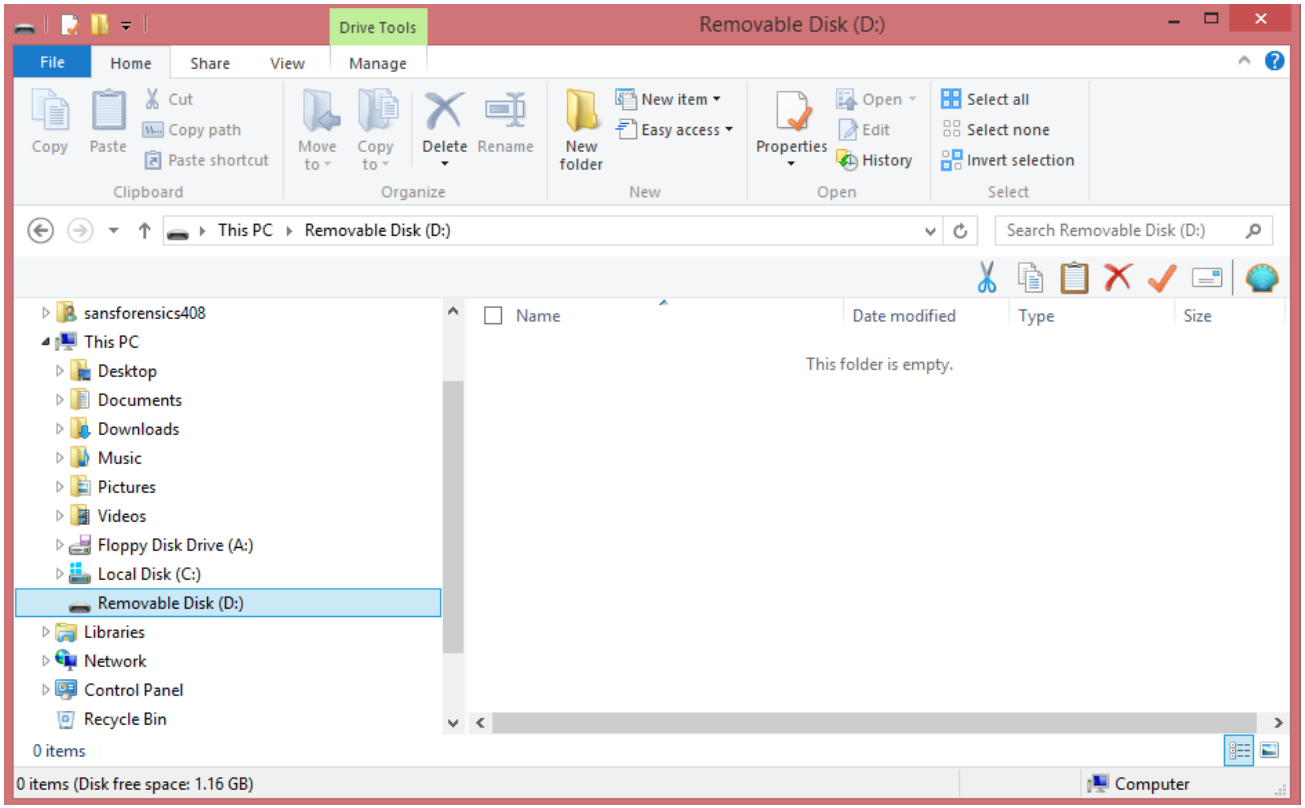
Format hard drive

- 5. Format Completed



Format hard drive

- 6. We have a fresh formatted drive



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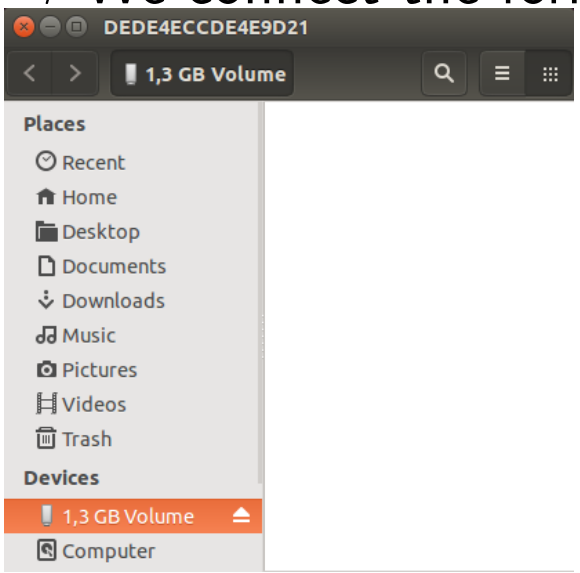
- Live exercise: Formated device

  → Can we restore some files?

  → We connect the formated device:



  → Looks empty!

Live exercise: Formated device

```
$ dmesg
...
...
[91701.937115]  sdb: sdb1
[91701.938433] sd 19:0:0:0: [sdb] No Caching mode page found
[91701.938436] sd 19:0:0:0: [sdb] Assuming drive cache: write through
[91701.938437] sd 19:0:0:0: [sdb] Attached SCSI removable disk


$ sudo fls -m / -r /dev/sdb1 > body.txt
$ mactime -b body.txt | less
...
...
Fri Sep 11 2015 14:28:01   262144 macb   0   0-128-6  /$MFT
                             4096 macb   0   1-128-1  /$MFTMirr
                           131072 macb   0   10-128-1 /$UpCase
                               32 macb   0   10-128-4 /$UpCase:$Info
                              448 macb   0   11-144-4 /$Extend
                          5259264 macb   0   2-128-1  /$LogFile
                                0 macb   0   3-128-3  /$Volume
                             2560 macb  48   4-128-4  /$AttrDef
                            38496 macb   0   6-128-4  /$Bitmap
                             8192 macb  48   7-128-1  /$Boot
...
...
```

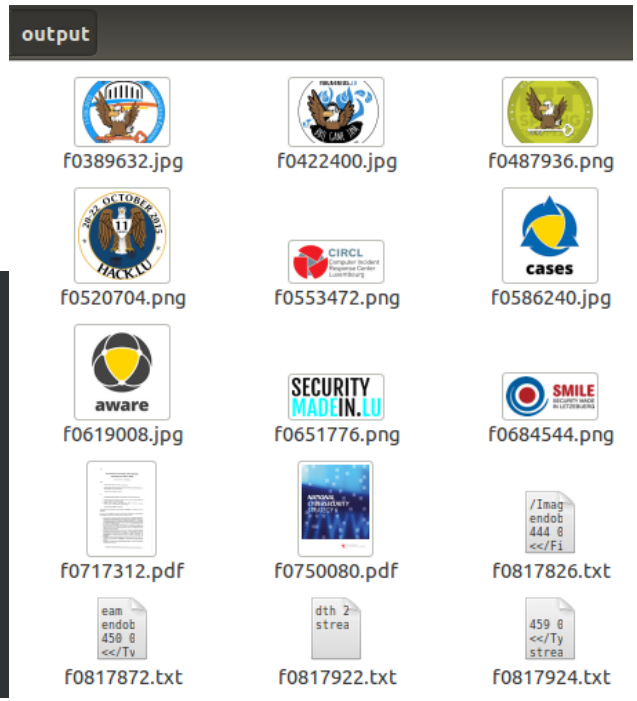
Live exercise: Formated device

```
$ sudo photorec /d /output
```

```
PhotoRec 6.14, Data Recovery Utility, July 2013
Christophe GRENIER <grenier@cgsecurity.org>
http://www.cgsecurity.org

Disk /dev/sdb - 8103 MB / 7728 MiB (RO) - USB Flash DISK
     Partition                  Start        End    Size in sectors
 1 P HPFS - NTFS              0  33  3   159  20 53    2463745


Pass 1 - Reading sector    2097554/2463745, 32 files found
Elapsed time 0h00m50s - Estimated time to completion 0h00m08
txt: 18 recovered
png: 6 recovered
jpg: 4 recovered
mp3: 2 recovered
pdf: 2 recovered
```



How does this work?

```
file1.txt = "123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ"
file2.txt = "11111111112222222222333333333344444444445555555555"
```

```
   Content                Metadata              Filename table
   -----------------      -----------------     -----------------
.. | ............. |   .. |                 |     | file1.txt = 6 |
50 | 45555555555.. |    2 |                 |     | file2.txt = 8 |
51 | ............. |    3 |                 |     |               |
52 | 123456789ABCD |    4 |                 |     |               |
53 | EFGHIJKLMNOPQ |    5 |                 |     |               |
54 | RSTUVWXYZ.... |    6 | Timestamps,     |     |               |
55 | ............. |      | Owner, Rights   |     |               |
56 | 3333444444444 |      | 52,53,54        |     |               |
.. | ............. |    7 |                 |     |               |
.. | ............. |    8 | Timestamps,     |     |               |
84 | 1111111111222 |      | Owner, Rights   |     |               |
85 | 2222222333333 |      | 84,85,56,50     |     |               |
.. | ............. |   .. |                 |     |               |
   -----------------      -----------------     -----------------
```

How does this work?

- Delete all files
  - Filename table: Filename is tagged as deleted
  - Meta data: Data units are tagged as not allocated
  - Data units: Data on disk are not deleted
    Data units: At some point in time they may get overwritten
  - Recovery: Meta data and Data units could be recovered

- Format hard drive
  - Filename table: Filename table is renewed
  - Meta data: Meta data structure is renewed
  - Data units: Data on disk are not deleted
    Data units: At some point in time they may get overwritten
  - Recovery: Data units could be recovered

Protect your data, protect your life

- Encrypt sensitive data / Full disk encryption (TrueCrypt, PGP, Safeboot, Bitlocker)
- Hardware encrypted drive
- Wipe out files / Wipe out drives
- Educate yourself https://www.privacysalon.lu/
- Physically destroy your drive