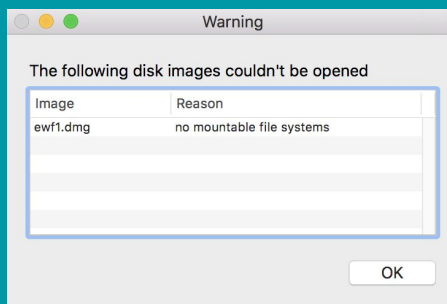


# Troubleshooting



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For any number reasons, sometimes you will have disk images that will not mount. This hardly indicates all hope is lost, but it is the beginning of a troubleshooting process. Like a lot of digital preservation troubleshooting, this will be more time consuming, and will need to be handled on a case by case basis. There are however, a few common sources of failure, and tools which can help address the issue or work around it.

## Try try again

- Do you have the original disk?
  - Will it mount?
  - Do the md5s match?
- Disk image with a different software
- Connect with a different interface
  - For example:
    - Instead of using SATA connection  
Connect over USB using an enclosure
    - Try a different disk drive



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If possible, going back to the source can be of great help. If you have the original disk, you can get a lot of information from there. Will the original disk mount? Does the checksum of the disk image match the checksum of the source? What file system does it use?

Imaging the source again, using a different methodology, such as a different software, or in the case of computer hard drives, connected over a different interface, can sometimes create a disk image that will be more compatible.

## Take advantage of all your options

- Try different operating systems
  - Always good to have VMs or computers running macos, Linux, and Windows
  - A “broken” disk image may simply mount in a different environment
- Try different tools
  - Disk Image Access may work where mounting may not
  - Brunnhilde may work if Disk Image Access does not
  - Tsk\_recover might work if Brunnhilde does not

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Incompatibility across operating systems can be a source of issues. Certain file systems have limited interoperability, and can even be unrecognized by other operating systems. Try mounting the disk image in different operating systems, or try mounting with with a different tool.

# Knowledge is power

```
bcadmin@bitcurator:~$ sudo mmls /dev/sda
DOS Partition Table
Offset Sector: 0
Units are in 512-byte sectors

   Slot      Start          End          Length      Description
000:  Meta     0000000000     0000000000     0000000001  Primary Table (#0)
001:  -----     0000000000     0000002047     0000002048  Unallocated
002:  000:000     0000002048     0536868863     0536866816  Linux (0x83)
003:  -----     0536868864     0536870911     0000002048  Unallocated
bcadmin@bitcurator:~$ sudo disktype /dev/sda

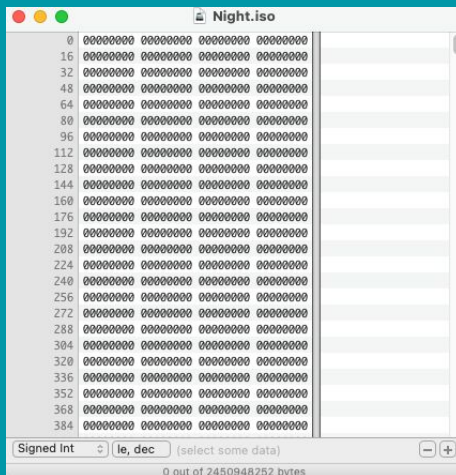
--- /dev/sda
Block device, size 256 GiB (274877906944 bytes)
GRUB boot loader, unknown compat version 1
DOS/MBR partition map
Partition 1: 256.0 GiB (274875809792 bytes, 536866816 sectors from 2048, bootable)
Type 0x83 (Linux)
Ext4 file system
  UUID D8909BAC-C4B1-4A66-941E-CF4F057B63B9 (DCE, v4)
  Last mounted at "/"
  Volume size 256.0 GiB (274875809792 bytes, 67108352 blocks of 4 KiB)
```

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Gather information about the disk image. Success in collecting information from the disk image is a good sign, it means that indicators and information are stored in the disk image. Use disktype to identify the file system of the disk image. Use mmls to identify the offset of the file system (or systems).. Multiple partitions, and multiple file systems, can complicate mounting a disk image or extracting information. This could very likely be related to any issues you're having with mounting

More granular tools like fiwalk and bulk\_extractor can tell you about the individual files that are stored within the disk image as well.

# Incomplete?



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If metadata extraction tools are not returning any results, try opening the disk image in a hex editor like hexfiend. It is possible that the disk image is empty, or incomplete, which will not allow it to mount. Be carefully with this though, a disk image can just have large chunks of zeroed data. This is a screengrab of a disk image that does have data on it and can be mounted in BitCurator, but cannot be mounted in macos.

## Carve out

```
mmls /path/to/disk_image.001
```

```
DOS Partition Table
```

```
Offset Sector: 0
```

```
Units are in 512-byte sectors
```

	Slot	Start	End	Length	Description
000:	Meta	0000000000	0000000000	0000000001	Primary Table (#0)
001:	-----	0000000000	0000008191	0000008192	Unallocated
002:	000:000	0000008192	0007626751	0007618560	Win95 FAT32 (0x0b)

```
tsk_recover -i raw -f fat32 -o 8192 /path/to/disk_image.001 /Users/eddy/Desktop/output
```

```
Files Recovered: 185
```

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If you are able to identify the offset, you may be able to carve files from the image using `tsk_recover`

# VBinDiff

```
bcadmin@ubuntu: ~  
File Edit View Search Terminal Help  
~/home/bcadmin/Desktop/14-22-Lozano-Hemmer raw txi fiwalk output.xml  
0000 0220: 20 20 20 20 3c 2f 62 75 69 6c 64 5f 65 6e 76 69  </bu lld env1  
0000 0230: 72 6f 6e 60 65 6e 74 3e 0a 20 20 20 20 3c 65 78  ronment> . <ex  
0000 0240: 65 63 75 74 69 6f 6e 5f 65 6e 76 69 72 6f 6e 60  ecution environm  
0000 0250: 65 6e 74 3e 0a 20 20 20 20 20 20 3c 63 6f 60 60  ent> . <comm  
0000 0260: 61 6e 64 5f 6e 69 6e 65 3e 66 69 77 61 6c 68 20  and line >fiwalk  
0000 0270: 20 58 20 2f 68 6f 60 65 2f 62 63 61 64 60 69 6e  -X /home /bcadmin  
0000 0280: 2f 44 65 73 68 74 6f 70 2f 33 34 30 32 33 34 35  /Desktop /14-22-1  
0000 0290: 8f 7a 81 84 8c 78 88 85 80 80 83 7f 5f 73 61 77  aram-the mmer raw  
0000 02a0: 5f 7a 7f 71 5f 66 69 77 61 6c 68 5f 6f 75 74 70  txi fiw alk outp  
0000 02b0: 75 74 2e 78 60 6c 20 2f 6a 69 69 61 6a 73 6a  ut.xml / home/bad  
0000 02c0: 8f 73 80 81 78 82 84 50 80 81 31 34 20 32 32 3f  haimon N/14-21  
0000 02d0: 4c 8f 78 61 80 8f 20 40 83 60 60 65 7f 5f 73 61  lozano-hemmer ra  
0000 02e0: 7f 8f 74 7f 31 3c 69 73 8f 31 2f 63 6f 60 60 61  v.121.1x 65/comm  
0000 02f0: 8a 8a 8f 8f 60 60 60 60 8a 8a 8a 8a 8a 8a 8a 8a  e/lines . <com  
0000 0300: 73 7f 61 73 70 3f 74 60 80 85 3c 3c 30 31 30 30  fiwalk 660201  
0000 0310: 31 40 20 20 20 20 31 30 34 30 30 30 30 32 34 34 3c 10-0010 /08/200  
0000 0320: 4f 73 74 61 72 74 6f 74 80 80 83 78 66 70 30 0  /start.1 lines.  
~/home/bcadmin/Desktop/Lozano-Hemmer 14-22 txi erf fiwalk output.xml  
0000 0220: 20 20 20 20 3c 2f 62 75 69 6c 64 5f 65 6e 76 69  </bu lld env1  
0000 0230: 72 6f 6e 60 65 6e 74 3e 0a 20 20 20 20 3c 65 78  ronment> . <ex  
0000 0240: 65 63 75 74 69 6f 6e 5f 65 6e 76 69 72 6f 6e 60  ecution environm  
0000 0250: 65 6e 74 3e 0a 20 20 20 20 20 20 3c 63 6f 60 60  ent> . <comm  
0000 0260: 61 6e 64 5f 6e 69 6e 65 3e 66 69 77 61 6c 68 20  and line >fiwalk  
0000 0270: 20 58 20 2f 68 6f 60 65 2f 62 63 61 64 60 69 6e  -X /home /bcadmin  
0000 0280: 2f 44 65 73 68 74 6f 70 2f 40 40 7a 81 80 8f 80  /Desktop /14-22-1  
0000 0290: 8f 80 80 80 80 80 80 80 80 80 80 80 80 80 80 80  haimon N/14-21  
0000 02a0: 5f 8f 7f 8f 5f 66 69 77 61 6c 68 5f 6f 75 74 70  erf fiw alk outp  
0000 02b0: 75 74 2e 78 60 6c 20 2f 8f 8f 80 80 81 83 81  ut.xml / home/bad  
0000 02c0: 8a 80 80 80 2f 60 8f 74 80 74 70 69 80 80 74 2f  deironed mpoint7  
0000 02d0: 85 7f 80 31 3c 2f 63 8f 80 60 61 65 74 5f 7c 69  e/lines haimon li  
0000 02e0: 8f 63 80 80 30 70 80 80 80 80 73 74 61 72 74 80  /start.1 lines  
0000 02f0: 0f 7f 00 00 00 00 00 00 00 00 00 00 00 00 00 00  haimon N/14-21  
0000 0300: 74 81 84 30 35 32 36 34 80 84 3c 2f 73 76 61 72  t.1lines <ex  
0000 0310: 74 81 74 69 60 60 60 60 80 80 80 80 80 80 80 80  e/lines <ex  
0000 0320: 4f 73 74 61 72 74 6f 74 80 80 83 78 66 70 30 0  /start.1 lines
```

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I also wanted to talk about this tool called [VBinDiff](#), which standards for Visual Binary Diff. The command shows differences in the hexadecimal code between two objects. The output is user friendly in that it helps one visualize minute differences between two digital objects. This could be a powerful tool when comparing much more minute changes between disk images or even small files.