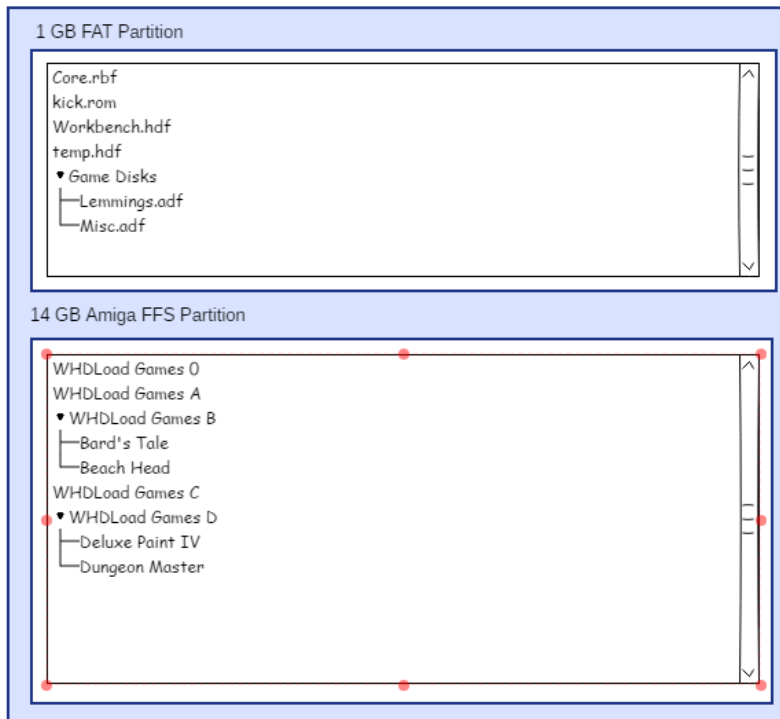


Mounting an SD Card FFS Partition on Linux (Fedora)

Summary

The goal for my SD Card Setup was to end up with a card that looks like this:

16 GB SD Card



The challenge I ran into was moving content onto the FFS partition. The FPGA system recognized and formatted the partition as a large hard drive just fine. However, the FPGA has limitations on getting mass content onto the large hard drive. Many do this using UAE, but attaching to a native FFS **secondary** partition on Windows via UAE was impossible. Windows did not recognize the partition so UAE could not access it. Some research revealed Linux could mount and access an FFS partition. This means you don't have to go through emulation to add files to the partition.

Mounting an FFS partition is one simple command, but you need to know the device name, offset, and partition size as well as having a mount point ready to go. The basic command is

```
sudo mount -t affs -o loop,offset=1032192,sizelimit=14854791168 /dev/sdg2 /run/media/Jerry/games
```

In order to get the information to finish up the command, follow the process below.

Create a Mount Point

I created it where the USB drives show up when inserted. Not sure if this is the best/standard place to manually create a mount point, but there it is. I also had to change the permissions on the mount point to allow write access so I just went all in (777)

```
cd /run/media/Jerry
mkdir games
sudo chmod 777 games
```

```
[Jerry@localhost Jerry]$ pwd
/run/media/Jerry
[Jerry@localhost Jerry]$ ls -l
total 16
drwxr-xr-x. 16 Jerry Jerry 16384 Dec 31 1969 AMIGA
drwxrwxrwx. 1 root root 0 Jul 30 18:45 games
```

Figure out your SD card device name

To do this I used the *findmnt* command. It lists all the mounted devices. I know my primary SD card partition is a Fat partition called AMIGA. In the findmnt command results I see the following line.

```
-/run/media/Jerry/AMIGA /dev/sdg1 vfat
```

From this I can assume that my SD Card is device /dev/sdg and my FFS partition is /dev/sdg2. Also, be aware that this device will likely change every time you remove and re-insert your SD card.

You can see the full results of the findmnt command in Appendix 1 below.

You can see /dev/sdg2 in the full device listing under /dev. You can see a sample /dev listing in Appendix 2 below.

View Partitions

By using the command *parted* a couple of times I can 1) verify my device is my SD Card and I can 2) get information on my FFS partition to complete the mount command.

On the first run below, you can see I am viewing all partitions on the /dev/sdg device. I see my fat partition first, followed by my ffs partition. For some reason, my system does not recognize the second partition as ffs at this time. Other tutorials seem to show parted recognizing that ffs partition.

Notes:

- When starting parted you must change the units to bytes. This is the u command followed by b at the (parted) prompt
- type quit at the (parted) prompt to exit the utility.

```
[Jerry@localhost Jerry]$ sudo parted /dev/sdg
```

```
[sudo] password for Jerry:
GNU Parted 3.2
Using /dev/sdg
Welcome to GNU Parted! Type 'help' to view a list of commands.
(parted) u
Unit? [compact]? b
(parted) p
Model: Generic STORAGE DEVICE (scsi)
Disk /dev/sdg: 15931539456B
Sector size (logical/physical): 512B/512B
Partition Table: msdos
Disk Flags:
```

| Number | Start | End | Size | Type | File system | Flags |
|--------|-------------|--------------|--------------|---------|-------------|-------|
| 1 | 1048576B | 1049624575B | 1048576000B | primary | fat16 | lba |
| 2 | 1049624576B | 15929966591B | 14880342016B | primary | | |

I run parted again, once again changing units to bytes, on /dev/sdg2 to verify it is my FFS partition and get the offset and size information. You will notice that it does recognize this partition as affs3, which is what we want to see.

```
[Jerry@localhost Jerry]$ sudo parted /dev/sdg2
GNU Parted 3.2
Using /dev/sdg2
Welcome to GNU Parted! Type 'help' to view a list of commands.
(parted) u
Unit? [compact]? b
(parted) p
Pralloc = 0, Reserved = 2, blocksize = 1, root block at 14508648
Model: Unknown (unknown)
Disk /dev/sdg2: 14880342016B
Sector size (logical/physical): 512B/512B
Partition Table: amiga
Disk Flags:
```

| Number | Start | End | Size | File system | Name | Flags |
|--------|----------|--------------|--------------|-------------|------|-------|
| 1 | 1032192B | 14855823359B | 14854791168B | affs3 | | DH1 |

The Final Command

Once I know my device name, the starting offset, and the partition size, I can create and run the command to mount the ffs partition.

```
sudo mount -t affs -o loop,offset=1032192,sizelimit=14854791168 /dev/sdg2 /run/media/Jerry/games
```

Resources:

This following links were very valuable in guiding me to this solution.

The primary resource for guiding me on mounting an AFFS partition:

<https://gareth.halfacree.co.uk/2013/03/mounting-amiga-ffs-hard-drives-under-linux>

Info on the affs file system for Linux

<https://www.kernel.org/doc/Documentation/filesystems/affs.txt>

Info on the findmnt command:

<https://www.ostechnix.com/how-to-find-the-mounted-filesystem-type-in-linux/>

Info on setting up loopbacks (but eventually not needed):

<https://bbs.archlinux.org/viewtopic.php?id=79020>

Man page on the mount command:

<https://linux.die.net/man/8/mount>

forum article leading me to know I needed the sizelimit parameter

<http://eab.abime.net/showthread.php?t=83887>

more info on mounting an .HDF file and using parted

<http://www.minimig.net/viewtopic.php?f=3&t=553>

Finding the VM Ware shared folders (for copying host files to the AFFS partition once mounted):

<https://askubuntu.com/questions/29284/how-do-i-mount-shared-folders-in-ubuntu-using-vmware-tools>

Appendix 1 – findmnt

Full findmnt command results below:

```
[Jerry@localhost Jerry]$ findmnt
TARGET          SOURCE          FSTYPE    OPTIONS
/               /dev/mapper/fedora-root
|              ext4           rw,relatime,seclabel
└-/sys         sysfs         sysfs     rw,nosuid,nodev,noexec,relatime,seclabel
| └-/sys/kernel/security securityfs securityfs rw,nosuid,nodev,noexec,relatime
| └-/sys/fs/cgroup tmpfs        tmpfs     ro,nosuid,nodev,noexec,seclabel,mode=755
|| └-/sys/fs/cgroup/unified cgroup2      cgroup2
rw,nosuid,nodev,noexec,relatime,seclabel,nsdelegate
|| └-/sys/fs/cgroup/systemd cgroup       cgroup
rw,nosuid,nodev,noexec,relatime,seclabel,xattr,name=systemd
|| └-/sys/fs/cgroup/devices cgroup       cgroup
rw,nosuid,nodev,noexec,relatime,seclabel,devices
|| └-/sys/fs/cgroup/perf_event cgroup       cgroup
rw,nosuid,nodev,noexec,relatime,seclabel,perf_event
|| └-/sys/fs/cgroup/cpuset cgroup       cgroup
rw,nosuid,nodev,noexec,relatime,seclabel,cpuset
|| └-/sys/fs/cgroup/hugetlb cgroup       cgroup
rw,nosuid,nodev,noexec,relatime,seclabel,hugetlb
|| └-/sys/fs/cgroup/net_cls,net_prio cgroup       cgroup
rw,nosuid,nodev,noexec,relatime,seclabel,net_cls,net_prio
|| └-/sys/fs/cgroup/pids cgroup       cgroup rw,nosuid,nodev,noexec,relatime,seclabel,pids
|| └-/sys/fs/cgroup/blkio cgroup       cgroup rw,nosuid,nodev,noexec,relatime,seclabel,blkio
|| └-/sys/fs/cgroup/cpu,cpuacct cgroup       cgroup
rw,nosuid,nodev,noexec,relatime,seclabel,cpu,cpuacct
|| └-/sys/fs/cgroup/freezer cgroup       cgroup
rw,nosuid,nodev,noexec,relatime,seclabel,freezer
|| └-/sys/fs/cgroup/memory cgroup       cgroup
rw,nosuid,nodev,noexec,relatime,seclabel,memory
| └-/sys/fs/pstore pstore      pstore   rw,nosuid,nodev,noexec,relatime,seclabel
| └-/sys/fs/bpf bpf         bpf      rw,nosuid,nodev,noexec,relatime,mode=700
| └-/sys/fs/selinux selinuxfs  selinuxfs rw,relatime
| └-/sys/kernel/debug debugfs    debugfs  rw,relatime,seclabel
| └-/sys/kernel/config configfs   configfs rw,relatime
| └-/sys/fs/fuse/connections fusectl    fusectl  rw,relatime
└-/proc        proc      proc     rw,nosuid,nodev,noexec,relatime
| └-/proc/sys/fs/binfmt_misc systemd-1 autofs
rw,relatime,fd=44,pgpr=1,timeout=0,minproto=5,maxproto=5,direct,pipe_ino=1617
```

```

└─/dev                devtmpfs devtmpfs
rw,nosuid,seclabel,size=1508396k,nr_inodes=377099,mode=755
| └─/dev/shm          tmpfs  tmpfs    rw,nosuid,nodev,seclabel
| └─/dev/pts          devpts devpts
rw,nosuid,noexec,relatime,seclabel,gid=5,mode=620,ptmxmode=000
| └─/dev/mqueue       mqueue mqueue   rw,relatime,seclabel
| └─/dev/hugepages    hugetlbfs hugetlbfs rw,relatime,seclabel,pagesize=2M
└─/run                tmpfs  tmpfs    rw,nosuid,nodev,seclabel,mode=755
| └─/run/media/Jerry/AMIGA /dev/sdg1 vfat
rw,nosuid,nodev,relatime,uid=1000,gid=1000,fmask=0022,dmask=0022,codepage=437
| └─/run/user/1000     tmpfs  tmpfs
rw,nosuid,nodev,relatime,seclabel,size=304600k,mode=700,uid=1000,gid=1000
| └─/run/user/1000/gvfs gvfsd-fuse fuse.gvfsd-fu
rw,nosuid,nodev,relatime,user_id=1000,group_id=1000
└─/tmp                tmpfs  tmpfs    rw,nosuid,nodev,seclabel
└─/boot                /dev/sda1 ext4     rw,relatime,seclabel
└─/home                /dev/mapper/fedora-home
|                       ext4     rw,relatime,seclabel
└─/var/lib/nfs/rpc_pipefs sunrpc  rpc_pipefs rw,relatime

```

Appendix 2 – View devices

To see the devices, navigate to /dev and get a directory listing. This will show you all the devices including the loopbacks and SD Card partitions.

```
[Jerry@localhost dev]$ pwd
/dev
[Jerry@localhost dev]$ ls -l
total 0
```

... Listing shorted to save trees ...

```
drwxr-xr-x. 4 root root    260 Jul 29 12:23 input
crw-r--r--. 1 root root    1, 11 Jul 29 12:23 kmsg
lrwxrwxrwx. 1 root root     28 Jul 29 12:23 log -> /run/systemd/journal/dev-log
brw-rw----. 1 root disk    7, 0 Jul 30 18:16 loop0
brw-rw----. 1 root disk    7, 1 Jul 30 17:49 loop1
brw-rw----. 1 root disk    7, 2 Jul 30 17:41 loop2
brw-rw----. 1 root disk    7, 3 Jul 30 17:40 loop3
crw-rw----. 1 root disk   10, 237 Jul 29 21:00 loop-control
crw-rw----. 1 root lp      6, 0 Jul 29 12:23 lp0
crw-rw----. 1 root lp      6, 1 Jul 29 12:23 lp1
crw-rw----. 1 root lp      6, 2 Jul 29 12:23 lp2
crw-rw----. 1 root lp      6, 3 Jul 29 12:23 lp3
drwxr-xr-x. 2 root root    120 Jul 29 12:23 mapper
crw----- . 1 root root   10, 227 Jul 29 12:23 mcelog
```

... Listing shorted to save trees ...

```
crw----- . 1 root root  251, 0 Jul 29 12:23 rtc0
brw-rw----. 1 root disk    8, 0 Jul 29 12:23 sda
brw-rw----. 1 root disk    8, 1 Jul 29 12:23 sda1
brw-rw----. 1 root disk    8, 2 Jul 29 12:23 sda2
brw-rw----. 1 root disk   16, 16 Jul 30 17:38 sdb
brw-rw----. 1 root disk   16, 32 Jul 30 17:38 sdc
brw-rw----. 1 root disk   16, 96 Jul 30 18:13 sdg
brw-rw----. 1 root disk   16, 97 Jul 30 18:14 sdg1
brw-rw----. 1 root disk   16, 98 Jul 30 18:58 sdg2
brw-rw----. 1 root disk   16, 112 Jul 30 17:38 sdh
brw-rw----. 1 root disk   16, 128 Jul 30 17:38 sdi
crw-rw----+ 1 root cdrom   21, 0 Jul 29 12:23 sg0
```

... Listing shorted to save trees ...

```
[Jerry@localhost dev]$
```