Audio with FreeBSD

Greg Lehey

LEMIS (SA) Pty Ltd

`grog@FreeBSD.org`

`grog@lemis.com`

Adelaide, 11 June 2003

Overview

- Audio formats: *CDA*, *WAV*, *MP3* and *Ogg Vorbis*.
- Playing CDs under FreeBSD.
- Playing MP3s locally.
- Copying CD data to disk.
- Converting from *WAV* to *MP3*.
- Using flash memory under FreeBSD.
- Writing data to external MP3 players.

Audio formats

- *CDA*: Format of data stored on CD-ROM. Stored on CD as 16 bit words, data rate 44.1 kHz, two channels. Uncompressed.

- *WAV*: Uncompressed data format, closely related to CD data format.

- *MP3*: Compressed format. Standard rates start at 64 kb/s and go up to at least 256 kb/s. Sound quality ''acceptable''. Hampered by license issues.

- *Ogg Vorbis*: free format, compressed.

Audio hardware

- Sounds chip handles multiple channels.
- Mixer software handles relative volume levels.
- By default, most channels set at 75% volume.
- This is often not enough.

Playing CDs

- Not much work required.
- Simple players run in text-based terminals: *cdplay*.
- *cdplay* port tries to open */dev/rcd0c* by default.
- Specify the device to get it to work:

```
$ cdplay -d /dev/acd0
```

Adjusting the mixer

```
$ mixer
Mixer vol      is currently set to   75:75
Mixer pcm      is currently set to   75:75
Mixer speaker  is currently set to   75:75
Mixer line     is currently set to   75:75
Mixer mic      is currently set to    0:0
Mixer cd       is currently set to   75:75
Mixer rec      is currently set to    0:0
Mixer line1    is currently set to   75:75
Mixer phin     is currently set to    0:0
Mixer phout    is currently set to    0:0
Mixer video    is currently set to   75:75
Mixer monitor  is currently set to   75:75
$ mixer vol 100
Setting the mixer vol from 75:75 to 100:100.
$ mixer cd 100
Setting the mixer cd from 75:75 to 100:100.
```

Playing CDs (2)

- Fractionally more sophisticated players run in their own X window: *xcdplayer*.

- *xcdplayer* port tries to open */dev/rcd0c* and */dev/rmcd0c* by default.

- Specify the device to get it to work:

```
$ xcdplayer -device /dev/acd0
```

- Functionality included in more complicated software: more later.

Playing MP3s

- Requires more effort on the part of the system.
- Play MP3s with *mpg123*.
- Man page doesn't match program.
- Set mixer pcm to 100:

```
$ mixer pcm 100
Setting the mixer pcm from 10:10 to 100:100.
```

Copying CD audio to disk

- Copies *CDA* data to disk and saves in *WAV* format.
- Commonly known as *ripping*.
- Use *grip*.

grip

- Part of the Gnome project.

- No man page.

- Help not very good. Does not match the program.

- Front end to other programs.

- Can be used to play audio CDs directly.

- Maintains a config file *~/.grip*.

- *.grip* defaults not very appropriate.

- See *.grip* config file at end of slides for suggested parameters.

grip (2)

- Changing config doesn't save until *grip* exits.

- Accesses your choice of a database of CD titles and information.

- The default appears to be freedb.freedb.org.

- About 90% hit rate.

- Saves files in a directory hierarchy named after the CD and track title.

- Can rip and encode in parallel.

Ripping

- Use *dagrab*.
- Difficult to set up parameters.
- Defaults not very appropriate.
- See *grip* config file at end of slides for suggested parameters.

Converting from WAV to MP3

- Called *encoding*.
- Use *lame*.
- Difficult to set up parameters.
- Defaults not very appropriate.
- See *grip* config file at end of slides for suggested parameters.

Compact flash devices

- Insert compact flash in PCMCIA slots with an adapter.
- Look like IDE disk drives.
- Can automount with *devd*.
- File systems normally Microsoft FAT16.
- ***Don't forget to umount before removing!***

USB flash devices

- USB appears as SCSI device.
- Some have quirks which FreeBSD release 4 can't handle.
- Can automount with *devd*.
- File systems normally Microsoft FAT16.
- ***Don't forget to umount before removing!***

Portable MP3 player

- Really a glorified USB flash device.
- Looks for files in the home directory ending in *MP3*.
- Not well matched to the file names that *grip* uses.
- Solution: script *mp3link* to create simpler file names.
- Copy MP3 files with standard UNIX utilities.

Demonstrations

- *cdplay*

- *mixer*

- *xcdplayer*

- *mpg123*

- *grip*

- Ripping and encoding.

- Compact flash devices.

- USB flash devices.

- Copying to USB MP3 player.

- Playing from USB MP3 player.

Resources

- These slides at *http://www.lemis.com/slides/audio/slides.pdf*

- Sample configuration file at *http://www.lemis.com/slides/audio/dotgrip*

- *mp3link* script at *http://www.lemis.com/slides/audio/mp3link*

- */etc/devd.conf* entries (not complete file) at *http://www.lemis.com/slides/audio/devd.conf*

.grip file (1)

```
GRIP 2
cd_device /dev/acd0
force_scsi
ripexename /usr/local/bin/dagrab
ripcmdline -d %c -f %w %t
wav_filter_cmd
disc_filter_cmd
mp3exename /usr/local/bin/lame
mp3cmdline -h -b %b %w %m
dbserver freedb.freedb.org
ripfileformat /var/spool/music/%A/%d/%t-%n.wav
mp3fileformat /var/spool/music/%A/%d/%t-%n.mp3
m3ufileformat ~/mp3/%A-%d.m3u
delete_wavs 1
add_m3u 1
rel_m3u 1
add_to_db 0
use_proxy 0
proxy_name
proxy_port 8000
proxy_user
proxy_pswd
cdupdate
user_email grog@lemis.com
ripnice 0
mp3nice 0
mp3_filter_cmd mp3link /var/spool/music/%!A/%!d %t-%!n.mp3 %t.mp3
```

.grip file (2)

```
doid3 1
doid3v2 1
tag_mp3_only 1
id3_comment Created by Grip
max_wavs 99
auto_rip 0
eject_after_rip 0
eject_delay 0
delay_before_rip 0
stop_between_tracks 0
beep_after_rip 1
faulty_eject 0
poll_drive 1
poll_interval 5
use_proxy_env 0
db_cgi ~cddb/cddb.cgi
cddb_submit_email freedb-submit@freedb.org
db_use_freedb 1
dbserver2
db2_cgi ~cddb/cddb.cgi
no_interrupt 1
stop_first 0
play_first 1
play_on_insert 0
automatic_cddb 1
automatic_reshuffle 0
```

.grip file (3)

```
no_lower_case 0
no_underscore 0
allow_high_bits 0
allow_these_chars
keep_min_size 1
num_cpu 1
kbits_per_sec 128
selected_encoder 1
selected_ripper 1
play_mode 0
playloop 0
volume 255
```

mp3link script

```
#!/bin/sh
echo -n "cwd: "
pwd
logger cwd: `pwd`  args: $*
mkdir -p $1/mp3
rm -r $1/mp3/$3
logger ln $1/$2 $1/mp3/$3
ln $1/$2 $1/mp3/$3
```

/etc/devd.conf entries

```
attach 0 {
        device-name "$ata-controller-regex";
        action "mount /camera";
};

attach 0 {
        device-name "umass[0-9]+";
        action "(sleep 2; mount /mp3)&";
};
```