DVD Authoring in Linux

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Lecture overview

- Introduction
- Getting the right video format
- Subtitles
- DVD Menus and tools for making them
- Checking before wasting a disc
- Burning the DVD

Video is Evil but sweet

... nothing is ever simple.

- It's messy ever since it began
- In the 1940's: PAL, NTSC, SECAM and hybrids
- Today: MPEG, Quicktime, Real Player media, Microsoft formats, and many more
- Patents
- Hidden implementation bugs
- Tolerance towards incompatibility

Why DVD, and not just VCD?

- It’s cooler
- Better video compression (MPEG-2 vs. MPEG-1)
- Less likely to freeze your player
- Menus
- Possible to make interactive discs
- Optional subtitles

The steps for making a video DVD

- Translate your video(s) to VOB
- Mix with subtitles
- Set up menus and buttons
- “Author”: Make an ISO image of DVD
- Check the ISO image
- Burn!

In theory, the process is simple...

Step I: Make a VOB

- This is the most difficult phase
- VOB is just MPEG-2 with some extra info packets for the player
- You can play a VOB just like any MPEG
- Your VOB must conform to DVD standard
- ... but it will play properly on the computer even if not
- ... and possibly on your specific DVD player too
- But what if you want to give the DVD away?

DVD standard for VOB

There are many formats allowed, see http://www.mplayerhq.hu/DOCS/HTML/en/menc-feat-vcd-dvd.html

- For video, the popular formats are:
- PAL: 720x576 at 25 fps with MPEG-2 at max 9800 kbits/sec
- NTSC: 720x480 at 30000/1001 fps with MPEG-2 at max 9800 kbits/sec
- Aspects 4:3 or 16:9 are chosen by side information
- Many other formats are within the standard
- For audio, there's mp2, AC3 and PCM at 48 kHz
- mp3 will probably work, but is not standard
- PCM is a waste of bandwidth
- Recommended: AC3 or mp2 at 192 kbits/sec

Encoding programs

Video codecs:

- ffmpeg: Fast, practical, somewhat dirty
- mpeg2enc: Accurate and slow

Front-end applications

- mencoder: Fast, practical, gives you an .mpg file in the end
- transcode: Slow, messy, gives you two separate files for video and audio, now mux them yourself
- The choice is pretty obvious.

mencoder example

http://www.mplayerhq.hu/DOCS/HTML/en/menc-feat-vcd-dvd.html

- There are endless variants
- No way to avoid knowing the gory details
- Keep your mencoder up-to-date
- Use the `vstrict=1` option!
- Example for PAL (mencoder-1.0), all in one line:

```
mencoder -oac lavc -ovc lavc -of mpeg
  -mpegopts format=dvd -vf scale=720:576,harddup
  -srate 48000 -af lavcresample=48000 -lavcopts
  vcodec=mpeg2video:vstrict=1:vrc_buf_size=1835:
  vrc_maxrate=9800:vbitrate=5000:keyint=15:
  acodec=ac3:abitrate=192:aspect=4/3 -ofps 25
  -o movie.mpg movie.avi
```

mencoder tweaks

- For encoding cinema-like videos, you don’t want to cover the entire screen:

```
-vf scale=720:400,expand=720:576,harddup
```

- Adjusting the volume (12 dB down here):

```
-af lavcresample=48000,volume=-12
```

mencoder: The “green boxes bug”

- This is not really a bug, but a detail missing in the docs (as of Nov. 2006)
- The “bug”: Playing on a DVD player, green boxes appear occasionally
- Not serious, but very annoying
- The solution is to tell the MPEG encoder to create “strict conforming MPEG” with the `vstrict=1` option
- This slide’s example includes the correct use of this option.

Step II: Mix with subtitles

- Subtitles are just images which are put on top of the movie
- DVD player doesn’t need to know about fonts
- Subtitles have a separate MPEG stream, so it needs to be muxed
- spumux will accept either images or subtitle text files
- Create a .spumux directory in your home directory, and put arial.ttf (or alike) True Type font there.
- DVD supports multiple channels, but the defaults will make optional subtitles the right way

```
spumux config.xml < movie.mpg > movie_subtitled.mpg
```

A config file for text subtitles

```
<subpictures>
 <stream>
  <textsub filename="the_subtitles.srt"
   characterset="ISO8859-1"
           fontsize="28.0" font="arial.ttf"
           horizontal-alignment="left"
           vertical-alignment="bottom"
           left-margin="60" right-margin="60"
           top-margin="20" bottom-margin="30"
           subtitle-fps="25" movie-fps="25"
           movie-width="720" movie-height="576"
           />
 </stream>
</subpictures>
```

- Not so bad, is it?

What an .srt file looks like

```
1
00:03:12,840 --> 00:03:17,630
<i>Maxime and I had known each other</i>
<i>so long, we didn’t need words</i>

2
00:03:18,840 --> 00:03:21,798
<i>We work together, but he’s the boss</i>
```

Step III: Authoring the DVD

- Set up the menus and flow
- Assemble several MPEGs to a single DVD
- Pick entry points in the middle of the MPEGs, and make them accessible from menu
- The DVD player is a small programmable computer with a few variables
- A full lecture can be filled with the details
- We shall look at the essentials only

Authoring tools

- `dvdauthor` produces an ISO image from media files based upon an XML description file
- `dvdstyler` is a GUI frontend, which allows easy design of the menus. It calls several command line tools, `dvdauthor` included
- `dvdunauthor` (part of the dvdauthor package) splits an ISO image or DVD disc to its components (it's pretty educational)
- Your starting point is `dvdstyler`

DVD menus

- Buttons are freely positioned on the menu
- Each button has three colors: Normal, highlighted and selected
- The buttons can also be transparent under these conditions, but don’t rely on that.
- The DVD’s remote-control’s navigation is explicitly controlled for each button.
- Each button’s action is also defined. This can be a small program (edit the XML file)
- The menu has a background image.
- The background image can be used to contain actual menu text (Hebrew?)

Step IV: Making an ISO image

- `dvdstyler` does that for you
- ... or `dvdauthor`, if you insisted to edit XML
- Remove previous ISO image before kicking off
- Check that ISO's size is reasonable

Step V: Verifying before burning

- ...yeah, right
- mplayer currently doesn’t support menus (experimental in recent versions)
- Xine is used to emulate a DVD player
- ... if you get it working.
- I use a DVD+RW
- Keep in mind that computer players are much more tolerant than DVD players

Step VI: Burning the disc

- Just like any DVD:

  ```
  growisofs -dvd-compat -Z /dev/scd0=mydvd.iso
  ```

- Try it out on your DVD
- If it works on your DVD player, you know that it works on *your player*
- If you have some green boxes appearing, you haven't read these slides at all!

Download checklist

- mplayer (recent version for mencoder)
- dvdauthor
- DVDStyler
- ... and anything else these will ask for (may be plenty)
- Compiling these is not necessarily fun

Thank you!

The slides were made with LaTeX
(`prosper` class)