



The State of the Linux Video Tools

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Video Tools

- ▶ Basic video terminology
- ▶ Video media players
- ▶ Playing DVDs
- ▶ Copying DVDs
- ▶ Encoding / Transcoding
- ▶ Video Editing
- ▶ The future of video



Technology Overview

- ▶ Codecs & formats
 - Container – Can hold multiple types of video
 - Format – the contents of the file (how the bits are arranged).
 - Codec – the encoder that created the contents of the files (arranger of bits).
- ▶ Multiple encoders can write files in the same format. (DivX, Xvid -> mpeg4)



File Formats

▶ Common Encoding

- mpeg4 – Official DVD format, not a codec.
- DivX – Microsoft mpeg4 compliant codec with limited capabilities.
- DivX5 – Replacement for DivX and DivX4. Closed source. Open Source version does not support all features.



Technology Overview

- ▶ Common Encoding Formats (continued)
 - XviD – Open Source codec that's really good at compression and quality. mpeg4 compliant.
 - mpeg1, mpeg2 – Older format used for VCD and SVCD disks.
 - dv – Format used by camcorders. Not compressed.



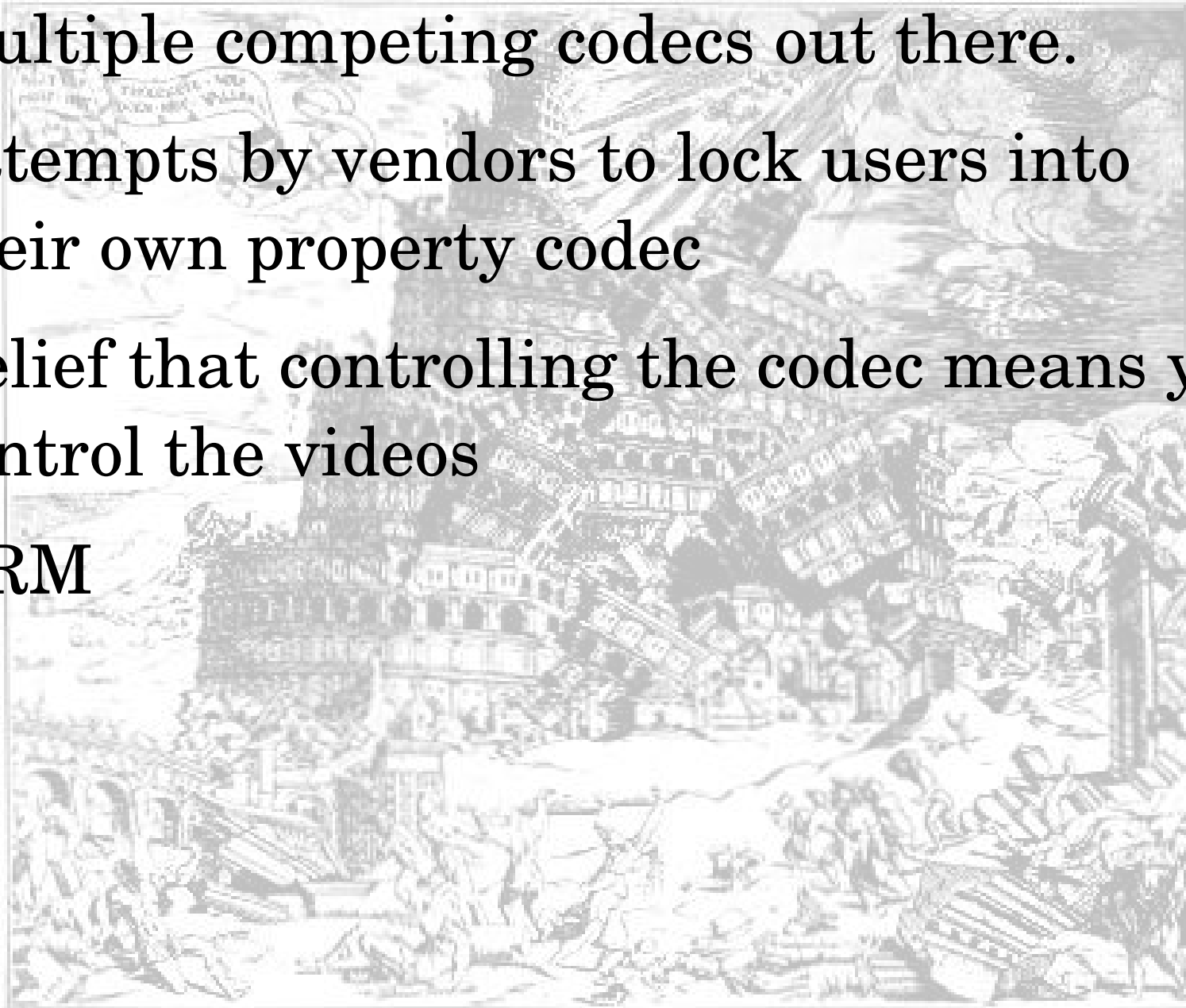
Technology Overview

▶ Disk formats

- DVD – Digital Video Disk
- VCD – CD Video disk
- Emovix – Bootable video player

Codecs – The tower of Babel

- ▶ Multiple competing codecs out there.
- ▶ Attempts by vendors to lock users into their own property codec
- ▶ Belief that controlling the codec means you control the videos
- ▶ DRM





Media Players

- ▶ xine
- ▶ mplayer
- ▶ vlc
- ▶ RealPlayer
- ▶ shockwave



xine Player





xine Player

- ▶ Handles most media types
- ▶ Can use Microsoft DDL files for some codecs
- ▶ Very nice command interface
- ▶ Plays DVDs, but hampered by poor command interface – Selecting titles, subtitles, and such difficult.

mplayer





mplayer

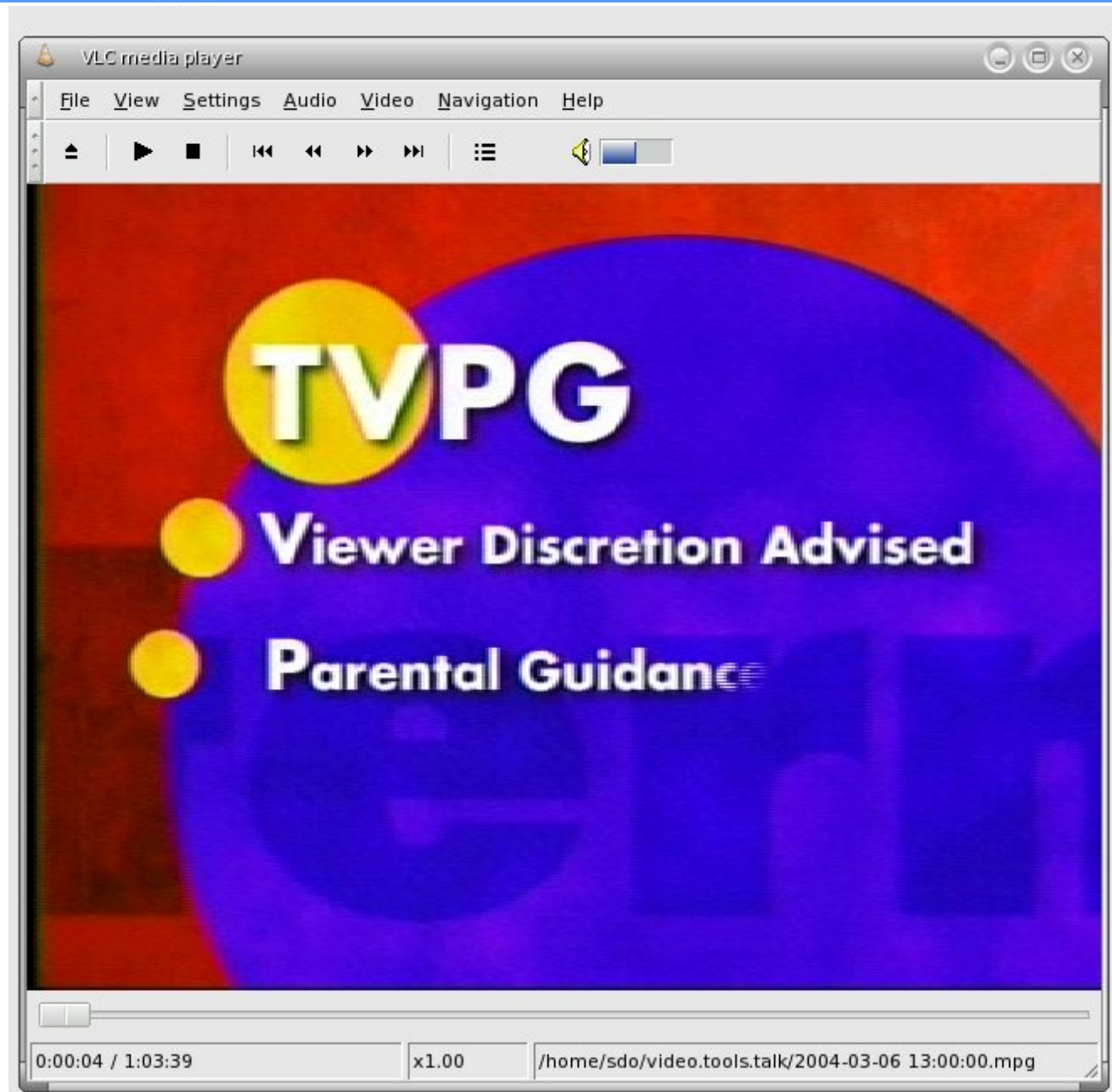
- ▶ No GUI! -- Use gmpayer for that
- ▶ Handles most media types
- ▶ Can use Microsoft DDL files for some codecs



mplayer

- ▶ Plays DVDs but user interface is *extremely* annoying
 - Can not change subtitle without restarting movie.
- ▶ Supports Edit Decision Lists (for skipping commercials)

vlc





vlc

- ▶ Very flexible player.
- ▶ Works with DLLs for some codecs.
- ▶ Can be a streaming server, receiver.
- ▶ Keyboard control limited and buggy
- ▶ Works very well with DVDs.
- ▶ Skips to the main menu when starting a DVD.



vlc

- ▶ Many many pieces
- ▶ Must install many plugins (on Mandrivia at least)
- ▶ Has the famous “ASCII Art” output module.



RealPlayer





RealPlayer

- ▶ Now open.
- ▶ Everyone else incorporates real codecs in their player.
- ▶ Won't play most media types.
- ▶ Never use



Shockwave

- ▶ Linux version available
- ▶ Finally you can watch www.youtube.com.



Playing DVDs

- ▶ Legal vs. Illegal DVD players
- ▶ libdecss
 - If you own it, it's legal to play it.
 - Actions of the MPAA created the whack-a-mole type protest.
- ▶ ogle player.
 - The RPM for Mandrivia 10.1 is broken, so no review.



TV Capture

- ▶ Video 4 Linux – TV Capture API and tools
- ▶ Buy capture cards with hardware encoders (software only capture / encoding never gets the sound in sync.)
- ▶ Recode the videos just after capture to reduce size by at least 1/2.
- ▶ zabs.zap2it.com – Free download of TV listings through `tv_grab_dd_na`.

MythTV



mythTV

- 

Schedule a Recording
- 

Watch TV
- 

Watch a Recording
- 

Fix Scheduling Conflicts
- 

Setup
- 

Delete Recordings



MythTV

- ▶ Difficult to install (but getting easier)
- ▶ Wants to take over your entire screen.
- ▶ Also wants a good hunk of your computer.
- ▶ Keyboard interface only. Navigation difficult, especially setup.
- ▶ Do not install if you do not have “click to type” set.



Encoding / Transcoding

- ▶ Reasons to Transcode
 - Create a DVD compatible video stream
 - Compress an existing video
 - Reduce the size or bitrate of a video
 - Change the format so you can edit it.
- ▶ Transcoding is slow. It easily take ten times as long to transcode a video as to watch it.



Transcoding

- ▶ Every transcoding program has 5,000 options.
- ▶ Plug-ins are used for encoding and decoding. Getting the right plug-ins is a challenge.
- ▶ Every plug-in has it's own options.



Transcoding Problems

- ▶ Transcoding takes time – Lots and lots of time
- ▶ Not all tools work for all formats



Transcoding Tools

- ▶ transcode
- ▶ memencoder
- ▶ ffmpeg



Transcoding Example

- ▶ To convert a mpeg video into DV format for kino

```
transcode \
```

```
-i 'funny_dog_show.mpg' \
```

```
-y mov -F dv -Z720x480 \
```

```
-o dvz.mov
```



Transcoding Example

- ▶ **-i *input-file***
- ▶ **-y mov** – Select the video output module. In this case the quicktime (mov) container.
- ▶ **-F dv** – Select the format for use in the container. (And audio codec if applicable – only 1 codec for dv.)
- ▶ **-Z720x480** – Resize the video to the given amount (kino is fussy about this)
- ▶ **-o *output-file***



Transcoding Example

- ▶ Time to process a 1 hour television show: 2 hours. (AMD Athlon(tm) XP 2400+)
- ▶ Size of input: 877M
- ▶ Size of output: 13G



Video Editing

Editing tasks

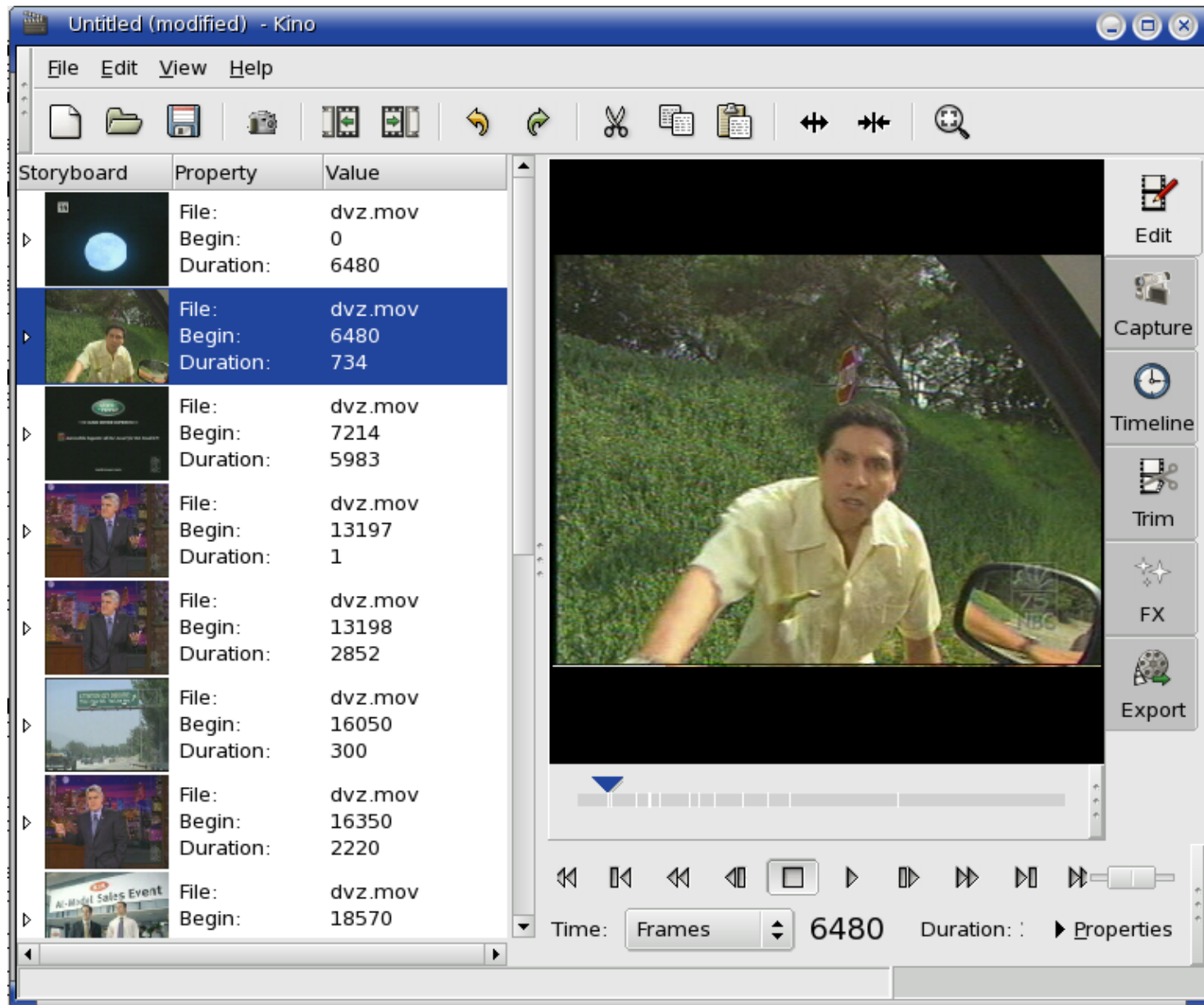
- ▶ Cutting a clip out of a television show
- ▶ Making DVD from a camcorder tape



Editors

- ▶ kino
- ▶ lve
- ▶ lives
- ▶ cinerama
- ▶ avidemix2

Video editing -- Kino

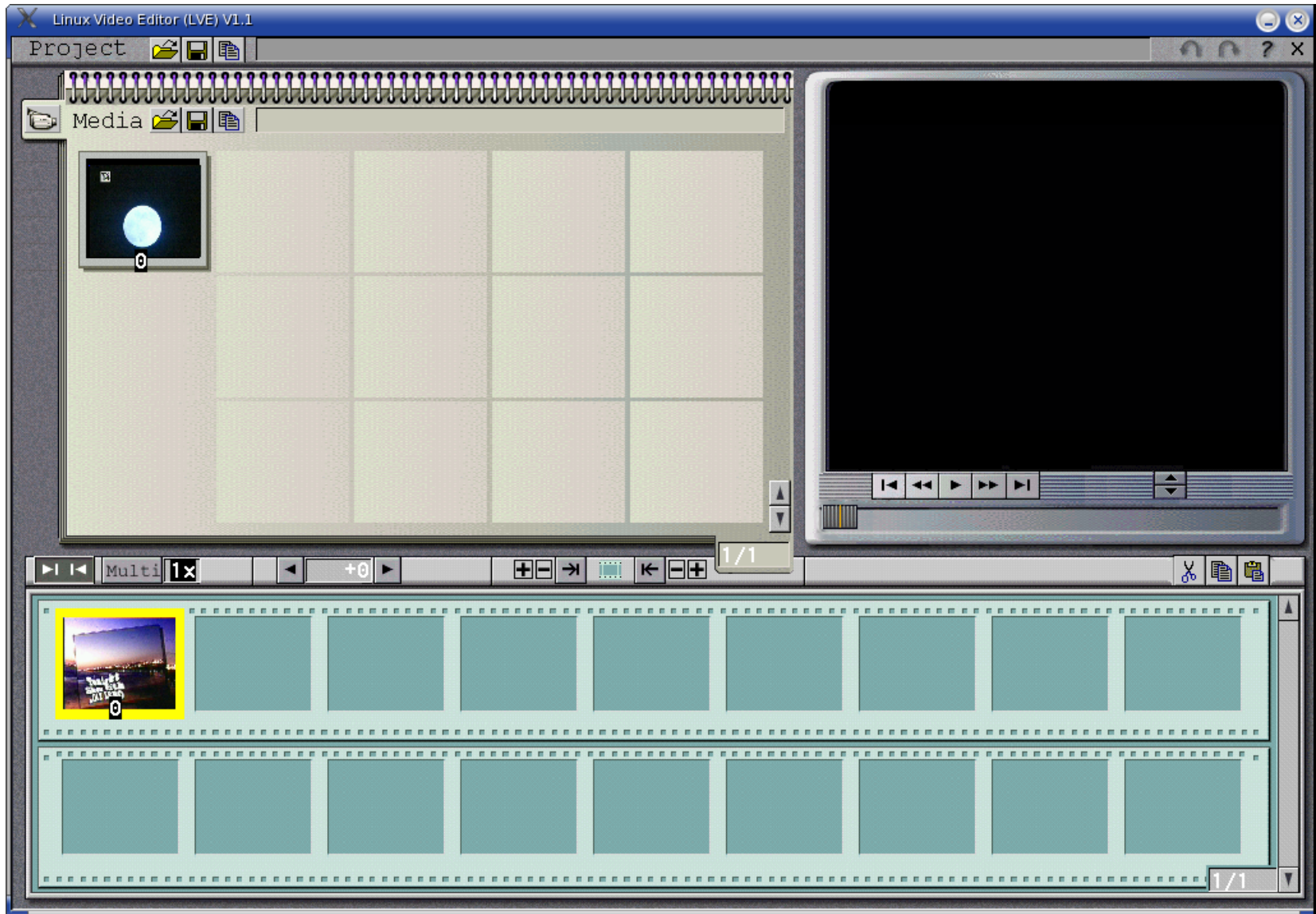




Video editing -- Kino

- ▶ Works well for DV (camcorder files)
- ▶ Very limited input support otherwise (annoying)
- ▶ Works fast enough to not be annoying
- ▶ Vi like keyboard controls.
- ▶ Simple edits – No complex transitions or sound editing.
- ▶ Good choice for home Camcorder to DVD projects

Video editing -- Lve





Video editing -- Lve

- ▶ Fast
- ▶ Works well with mpeg files
- ▶ Better input / output support
- ▶ No documentation to speak of
- ▶ Suggest avidmux2 instead. Does more and is documented.




Video editing -- Lives


LIVES-0.9.5-pre2.2: </mnt/video/save/The Tonight Show With Jay Leno/2002-05-17 23:35:00.mpg> 352x480 : 981 frames 24 bpp 29.970 fps

File Edit Play Effects Tools Audio Info Clips | Advanced VJ Toys Help

First Frame



Last Frame



1 [25.89 sec] Selection [776 frames] 776

LIVES

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32

Video [32.73 sec]

Left Audio [32.77 sec]

Right Audio [32.77 sec]

Switched to clip Untitled1
Pasted 500 frames to new clip.
Pasted 500 frames to new clip.

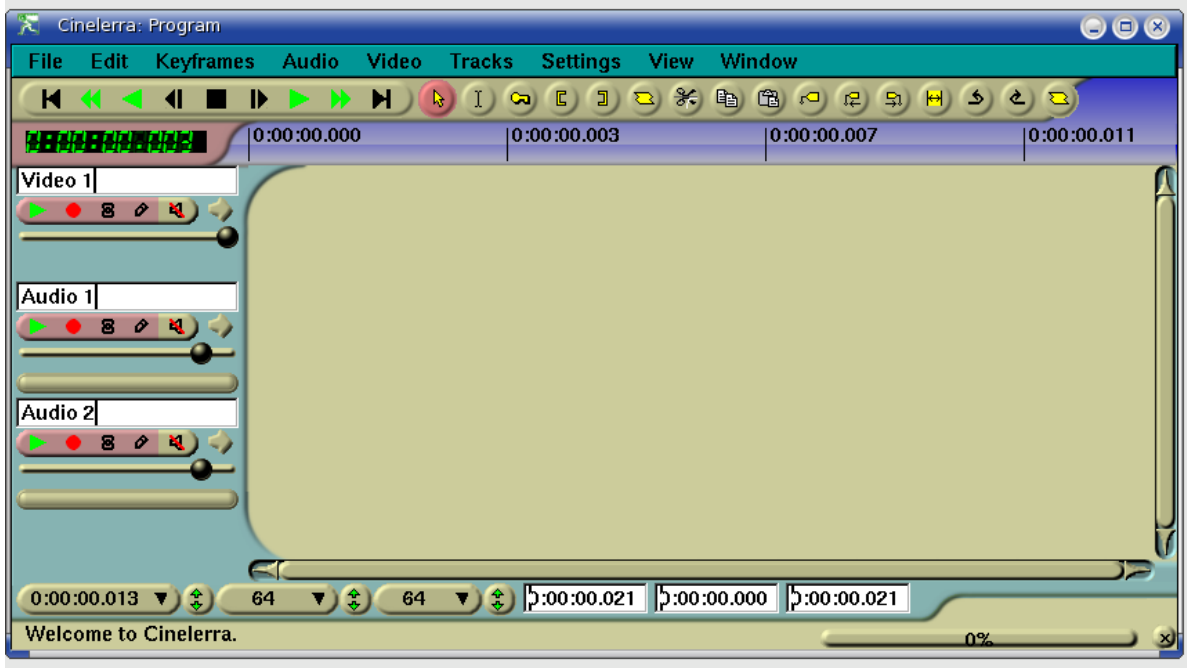
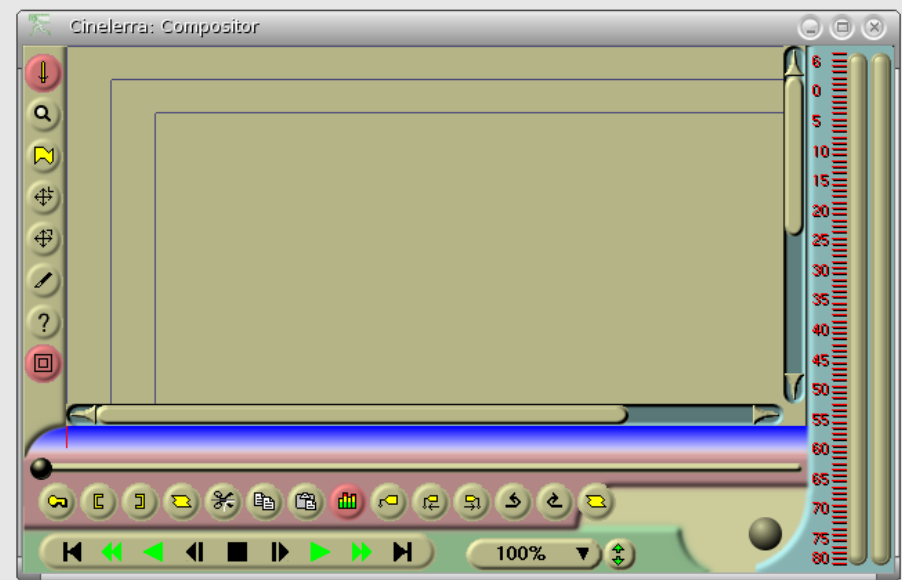
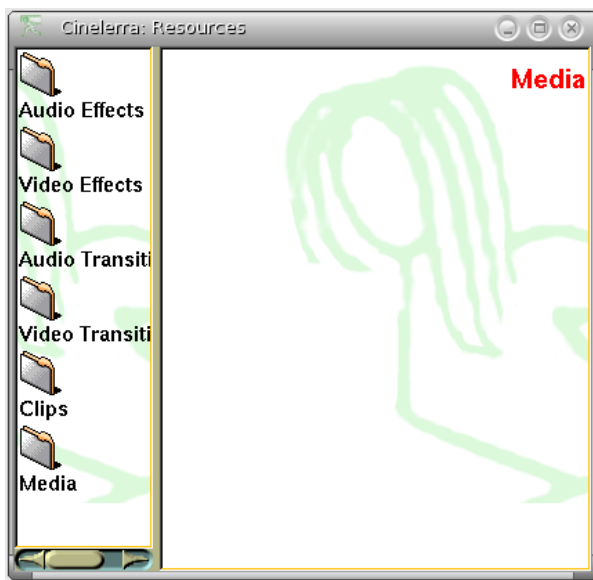
=====
Switched to clip Untitled2
Pasted 500 frames to new clip.



Video editing -- Lives

- ▶ Appears to be full featured.
- ▶ Very slow open speed.
- ▶ Does not import the whole file by default.
- ▶ Sound does work with my system. (ALSA only?)

Video editing -- cinelerra

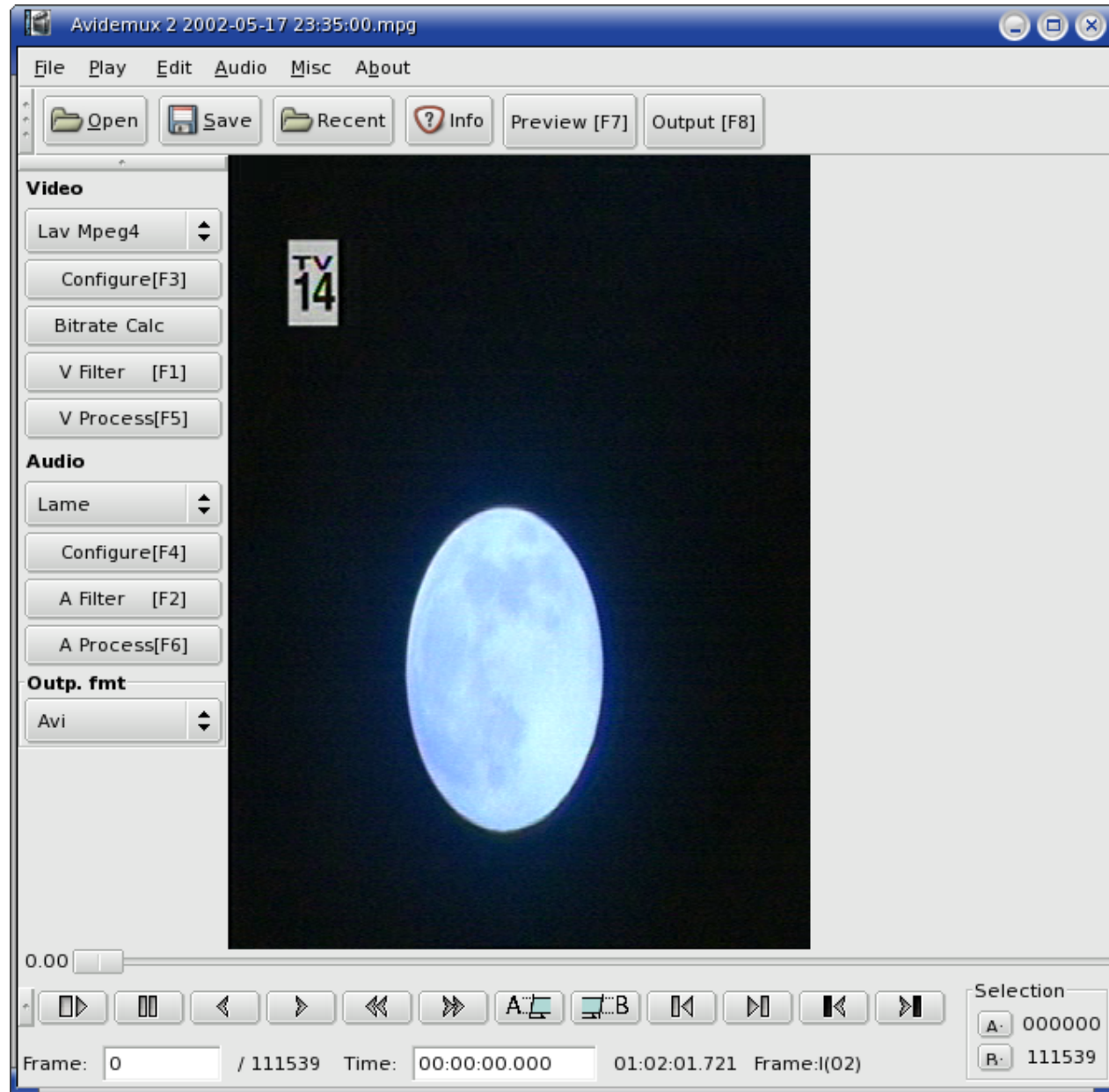




Video editing -- cinelerra

- ▶ Supposed to be a professional class editing system.
- ▶ Documentation 186 page manual
- ▶ Never could figure it out.

Video editing -- avidemix2





Video editing -- avidemix2

- ▶ Fast
- ▶ Full set of features
- ▶ Find black feature – Commercial Skip
- ▶ Scripting features




DVD Structure

- ▶ Top level is a menu (a video clip with other information added)
- ▶ Disk is divided into titles
- ▶ Titles are divided into chapters
- ▶ To display slides you need to turn a picture into short video clip.



Basic Tools for Making DVDs

- ▶ `tovid` – Convert video to DVD mpeg stream
- ▶ `makemenu` – Create top level menu
- ▶ `makexml` – Create xml file describing the video
- ▶ `dvdauthor` – Create DVD file set
- ▶ `mkisofs` – Create DVD image



Creating a DVD file

```
tovid -dvd -in raw/video.avi \  
      -out dvd/video1.mpg
```

- ▶ Uses mpeg2enc to transcode the file
- ▶ Takes 2 hours to do an hour video



Creating the menu

```
makemenu "1: Birth" \  
         "2: Growing up" \  
         -background pict.png \  
         -out menu.mpg
```

- ▶ Generates the short “menu” video and other meta data for a DVD menu



Make the DVD description

```
makexml -dvd -menu menu.mpg  
-chapters 5 \  
video1.mpg video2.mpg \  
dvd
```

- ▶ `dvdauthor` uses a complex xml file to describe the DVD. This program creates it from simple input.



Make the DVD file system

```
dvdauthor -x dvd.xml
```

- ▶ Creates a file system containing the files which make up the DVD

- ▶ To test use vlc:

```
vlc dvd://`pwd`
```



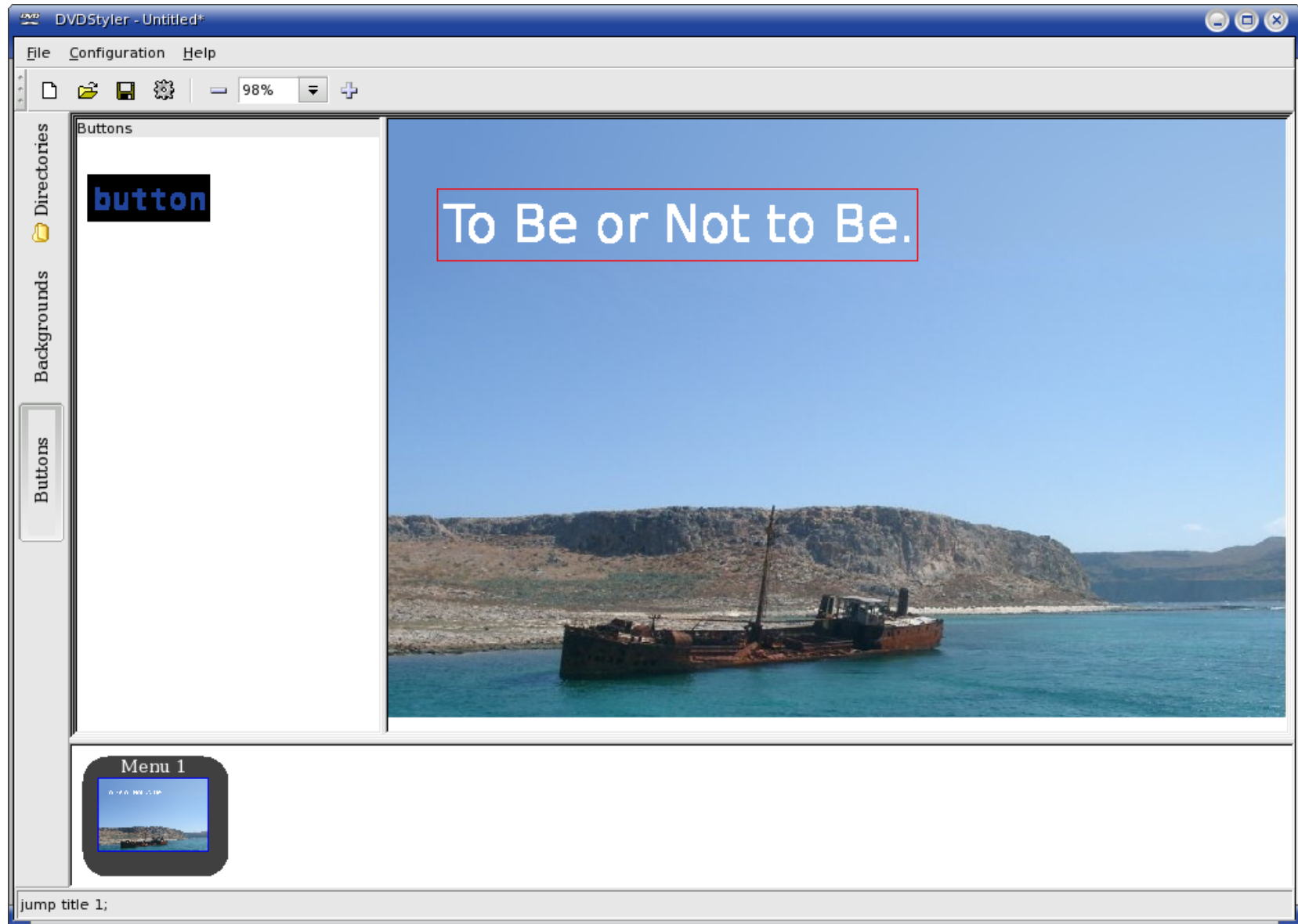

Make the DVD image

```
mkisofs --dvd-video \  
        -o ../dvd.iso .
```

- ▶ Creates a burnable image of the DVD.
- ▶ Do not put output file in same directory as the input.
- ▶ You can test the image too:

```
vlc dvd:///`pwd`/../dvd.iso
```

Interactive DVD Creation





Interactive DVD Creation

- ▶ Handles menu creation
- ▶ Adding clips to the DVD
- ▶ Multiple Menus
- ▶ Background images for menus
- ▶ Front end to dvdauthor

Microsoft Vista





Vista Lockdown

Basic Vista design rule:

**If Microsoft doesn't
approve it you can
only use it in
degraded mode.**



Vista Lockdown

- ▶ Devices carry unique manufacture Ids.
- ▶ Devices must have circuits that prevent anyone from discovering how they work.
- ▶ All drivers must be approved by Microsoft and provided with a Microsoft certificate.
- ▶ If someone figures out how to use a device (Linux users) Microsoft can revoke the certificate.

Will Users Stand for it?

- ▶ Anyone remember DIVX?
- ▶ What's going to happen to legal users when a crack is found and a certificate revoked?





Linux Tools

- ▶ Complex -> Simple
- ▶ Slow -> Fast (Mostly due to hardware)
- ▶ Political -> Very Interesting Political