VCR−HOWTO − Using your GNU/Linux computer as a VCR

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VCR−HOWTO − Using your GNU/Linux computer as a VCR

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This is a guide to setting up your GNU/Linux workstation as a digital VCR using the video4linux driver and a supported tuner card. A section has been added for creating VCD's that can be played in any DVD/VCD player as well.

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5. Further Information

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1. Introduction

This is a guide to setting up your GNU/Linux computer as a VCR. Setting up my VCR took a little research, but it didn't turn out to be as difficult as I thought. I decided to publish my results so others may benefit from what I've done. This is by no means the only method to achieve the same results as there are several applications out there that may perform similar tasks. Hopefully any unique procedures for configuring other software or devices may be incorporated into this document.

1.1 Copyright

1.2 Disclaimer

Use the information in this document at your own risk. I disavow any potential liability for the contents of this document. Use of the concepts, examples, and/or other content of this document is entirely at your own risk.

You are strongly recommended to take a backup of your system before major installation and backups at regular intervals.

1.3 News

This is the first release. No news yet.

The latest version of this document can be found at Here.

1.4 Credits

The following individuals either helped me directly or indirectly during the process of developing this HOWTO. Several tips that were suggested by these people have not been added to this document yet, don't worry − all in good time.

```
david (at) lupercalia.net -- For talking me into learning SGML
sjgoen (at) nyx.net -- The template for this HOWTO
knordberg (at) oru.edu -- Help with design and proof reading of this HOWTO
serge (at) tux.org -- Lots of Tips for expanding the document
gferg (at) hoop.timonium.sgi.com -- Help with SGML
remenyi (at) ace-net.com.au -- Suggestions for expanding this document
nando (at) antunes.eti.br -- Working on Portuguese Translation.
linuxpe (at) uol.com.br -- Working on Portuguese Translation.
sam (at) daemoninc.com -- Tips for expanding this document.
HeikoL77 (at) web.de -- Links to more information.
Henry.Kingman (at) zdnet.com -- Links to more information on supported video cards.
aoe (at) mars.tuwien.ac.at -- Alexander provided the section on creating VCD's.
```

1.5 Translations

Marcio Montenegro was kind enough to translate this document to Portuguese. His translation is available at this site. Feel free to translate this document to other languages. If you send me a link, I will credit you and include it in this document. Please note that for it to be included in the Linux Documentation Project, you will have to provide it in sgml format.

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2. Technologies

This section describes the different technologies used to build your own Linux VCR.

2.1 Tuner or Capture Card

You will need to install a supported video4linux capture card in your computer. I currently use the Hauppauge WinTV tuner card which I purchased from Best Buy, but many other cards should work just as well. I don't have a suggestion for which is best, I can only comment that the one I own works for me.

2.2 Kernel video4linux driver

Many GNU/Linux distributions already provide a Linux kernel that is configured to support video4linux devices. The Hauppauge WinTV card is supported by the 'bttv' driver. I have to load two modules into the linux kernel to support my card, namely the 'tuner' and 'bttv' modules. Check out the V4L homepage for details on supported tuner cards. Also check out ZDnet Linux Hardware for information about Linux tuner cards.

2.3 Frame Capture Software

Recording with your digital VCR of course requires frame capture software. As I become aware of available software for capturing audio/video to mpeg/avi formats, I will place it in this list. If you have any suggestions for good software please let me know and I'll add it here.

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3. Implementation

Now lets go through the steps of actually configuring your computer as a VCR.

3.1 Install and Configure Tuner Card

My particular tuner card required special parameters to the 'tuner' and 'bttv' modules because it was an older model and wasn't properly auto−detected. If you can watch TV through your card via xawtv, then you have correctly configured your card. Here are the configuration lines from my /etc/modules.conf (or /etc/conf.modules for older distributions).

```
options -k bttv radio=1 card=2
options -k tuner debug=0 type=6
```

These parameters will vary depending on the model of your card, see the documentation found in the linux source (linux/Documentation/video4linux) to figure out exactly how to configure your card. I added these modules to /etc/modules so they would automatically load on bootup. You can also manually load them with 'modprobe modulename' as root. I'm currently using the 2.4.2 kernel, but I have had success with this card with all of the 2.2.x kernels as well. Hint: the user may need to have ownership of the /dev/video /dev/video0 files (and maybe other devices as well) before the tuner card will function. As always, I suggest not running any apps as root.

3.2 Configure xawtv to function properly.

You can either use xawtv from a reasonably current distribution, or download the source code from the xawtv Homepage Make sure xawtv functions for your tuner card before proceeding.

Sample .xawtv configuration file.

Here is a sample ".xawtv" configuration file. This should be placed within the home directory for the user who will be doing the VCR recording. I suggest adding presets to your .xawtv file for all channels(0−NNN) (even non−existing ones) because you will use the "v4lctl" command to switch channels later. This command makes use of 'preset number' rather than 'channel number', so it's convenient to have preset numbers be the same as actual channel numbers. The following configuration file was designed for US−cable, your mileage may vary.

```
[global]
freqtab = us-cable
pixsize = 128 x 96
pixcols = 1
jpeg-quality = 75
mjpeg-quality = 75
toggle-mouse = 0
keypad-ntsc = no
osd = yes

# [Station name]
# capture = overlay | grabdisplay | on | off
# input = Television | Composite1 | S-Video | ...
# norm = PAL | NTSC | SECAM | ...
# channel = #
# fine = # (-128..+127)
# key = keysym | modifier+keysym
# color = #
# bright = #
# hue = #
# contrast = #

[defaults]
norm = NTSC
capture = over
input = Television


[CH0 0]
channel = 0
fine = 0

[CH1 1]
channel = 1
fine = 0

[CH2 2]
channel = 2
fine = 0

[CH3 3]
channel = 3
fine = 0

[CH4 4]
channel = 4
fine = 0

[CH5 5]
channel = 5
fine = 0

[CH6 6]
channel = 6
fine = 0

[CH7 7]
channel = 7
```

```
fine = 0

[CH8 8]
channel = 8
fine = 0

[CH9 9]
channel = 9
fine = 0

[CH10 10]
channel = 10
fine = 0

[CH11 11]
channel = 11
fine = 0

[CH12 12]
channel = 12
fine = 0

[CH13 13]
channel = 13
fine = 0

[CH14 14]
channel = 14
fine = 0

[CH15 15]
channel = 15
fine = 0

[CH16 16]
channel = 16
fine = 0

[CH17 17]
channel = 17
fine = 0

[CH18 18]
channel = 18
fine = 0

[CH19 19]
channel = 19
fine = 0

[CH20 20]
channel = 20
fine = 0

[CH21 21]
channel = 21
fine = 0

[CH22 22]
channel = 22
fine = 0
```

```
[CH23 23]
channel = 23
fine = 0

[CH24 24]
channel = 24
fine = 0

[CH25 25]
channel = 25
fine = 0

[CH26 26]
channel = 26
fine = 0

[CH27 27]
channel = 27
fine = 0

[CH28 28]
channel = 28
fine = 0

[CH29 29]
channel = 29
fine = 0

[CH30 30]
channel = 30
fine = 0

[CH31 31]
channel = 31
fine = 0

[CH32 32]
channel = 32
fine = 0

[CH33 33]
channel = 33
fine = 0

[CH34 34]
channel = 34
fine = 0

[CH35 35]
channel = 35
fine = 0

[CH36 36]
channel = 36
fine = 0

[CH37 37]
channel = 37
fine = 0

[CH38 38]
channel = 38
```

```
fine = 0

[CH39 39]
channel = 39
fine = 0

[CH40 40]
channel = 40
fine = 0

[CH41 41]
channel = 41
fine = 0

[CH42 42]
channel = 42
fine = 0

[CH43 43]
channel = 43
fine = 0

[CH44 44]
channel = 44
fine = 0

[CH45 45]
channel = 45
fine = 0

[CH46 46]
channel = 46
fine = 0

[CH47 47]
channel = 47
fine = 0

[CH48 48]
channel = 48
fine = 0

[CH49 49]
channel = 49
fine = 0

[CH50 50]
channel = 50
fine = 0

[CH51 51]
channel = 51
fine = 0

[CH52 52]
channel = 52
fine = 0

[CH53 53]
channel = 53
fine = 0
```

```
[CH54 54]
channel = 54
fine = 0

[CH55 55]
channel = 55
fine = 0

[CH56 56]
channel = 56
fine = 0

[CH57 57]
channel = 57
fine = 0

[CH58 58]
channel = 58
fine = 0

[CH59 59]
channel = 59
fine = 0
```

3.3 Install the avifile library

Download the latest avifile package from DiVX :−) Homepage. You will need avifile−0.5x and binaries−xxxxxx.zip. You should extract the binaries to /usr/lib/win32. The next section describes compiling and installing avifile−0.53−5.

Compiling and installing avifile−0.53−5

```
# tar xvfz avifile-0.53-5.tar.gz
# cd avifile-0.53-5
# ./configure
# make
# make install
# mkdir /usr/lib/win32
# cd /usr/lib/win32
# unzip /path/to/binaries-010122.zip
```

You will need to be root for the make install step to work. If you receive any errors, they were probably due to a missing dependency during the configure step. Resolve any dependencies and try again. This should work smoothly on any recent distribution that was installed with 'development' tools.

3.4 Installing the VCR frame−grabber program

You can get the latest vcr program (vcr−1.07 at the time I wrote this) from The VCR Homepage.

Compiling and installing vcr−1.07

You will need to be root for the make install step to work.

```
# tar xvfz vcr-1.07.tar.gz
# cd vcr-1.07
```

```
# ./configure
# make
# make install
```

Sample .vcrrc configuration file

By default, vcr installs everything into /usr/local (unless you changed the prefix on the ./configure line). You can now read the man page for vcr with: 'man −M/usr/local/man vcr'. This is where I got the initial .vcrrc file. I configured this one for my needs and added the same presets to this file as I did with the .xawtv file. If you think these files look similar, it's because vcr was originally based on the xawtv code base. Here is the .vcrrc I use: (note that the new 'audiobitrate' parameter means record audio in mp3 format at the specified bitrate. mp3 audio is MUCH! smaller than PCM audio that vcr records by default. 30 minutes = 113 megs for mp3 instead of 240megs for PCM!).

```
[defaults]
quality = 95
keyframes = 15
codec = DivX ;−) low−motion
attributes = BitRate=1600
source = Television
norm = ntsc
verbose = 1
freqtab = us−cable
audiofrequency=44
audiobitrate=64
resolution=384
framerate = 29.97
grabdevice=/dev/video0


[CH0 0]
channel = 0
fine = 0

[CH1 1]
channel = 1
fine = 0

[CH2 2]
channel = 2
fine = 0

[CH3 3]
channel = 3
fine = 0

[CH4 4]
channel = 4
fine = 0

[CH5 5]
channel = 5
fine = 0

[CH6 6]
channel = 6
fine = 0

[CH7 7]
```

```
channel = 7
fine = 0

[CH8 8]
channel = 8
fine = 0

[CH9 9]
channel = 9
fine = 0

[CH10 10]
channel = 10
fine = 0

[CH11 11]
channel = 11
fine = 0

[CH12 12]
channel = 12
fine = 0

[CH13 13]
channel = 13
fine = 0

[CH14 14]
channel = 14
fine = 0

[CH15 15]
channel = 15
fine = 0

[CH16 16]
channel = 16
fine = 0

[CH17 17]
channel = 17
fine = 0

[CH18 18]
channel = 18
fine = 0

[CH19 19]
channel = 19
fine = 0

[CH20 20]
channel = 20
fine = 0

[CH21 21]
channel = 21
fine = 0

[CH22 22]
channel = 22
fine = 0
```

```
[CH23 23]
channel = 23
fine = 0

[CH24 24]
channel = 24
fine = 0

[CH25 25]
channel = 25
fine = 0

[CH26 26]
channel = 26
fine = 0

[CH27 27]
channel = 27
fine = 0

[CH28 28]
channel = 28
fine = 0

[CH29 29]
channel = 29
fine = 0

[CH30 30]
channel = 30
fine = 0

[CH31 31]
channel = 31
fine = 0

[CH32 32]
channel = 32
fine = 0

[CH33 33]
channel = 33
fine = 0

[CH34 34]
channel = 34
fine = 0

[CH35 35]
channel = 35
fine = 0

[CH36 36]
channel = 36
fine = 0

[CH37 37]
channel = 37
fine = 0

[CH38 38]
```

```
channel = 38
fine = 0

[CH39 39]
channel = 39
fine = 0

[CH40 40]
channel = 40
fine = 0

[CH41 41]
channel = 41
fine = 0

[CH42 42]
channel = 42
fine = 0

[CH43 43]
channel = 43
fine = 0

[CH44 44]
channel = 44
fine = 0

[CH45 45]
channel = 45
fine = 0

[CH46 46]
channel = 46
fine = 0

[CH47 47]
channel = 47
fine = 0

[CH48 48]
channel = 48
fine = 0

[CH49 49]
channel = 49
fine = 0

[CH50 50]
channel = 50
fine = 0

[CH51 51]
channel = 51
fine = 0

[CH52 52]
channel = 52
fine = 0

[CH53 53]
channel = 53
fine = 0
```

```
[CH54 54]
channel = 54
fine = 0

[CH55 55]
channel = 55
fine = 0

[CH56 56]
channel = 56
fine = 0

[CH57 57]
channel = 57
fine = 0

[CH58 58]
channel = 58
fine = 0

[CH59 59]
channel = 59
fine = 0
```

3.5 Using cron to record your favorite program.

You may want to verify vcr will record your program before setting up cron to record your programs. You can test this by doing "vcr −t 2m test.avi", then try to play back that two−minute sample using aviplay. Note that you will need to add '/usr/local/bin' to your path and '/usr/local/lib' to your ld library path for this to work properly. It was also suggested that you can use 'at' to record your program as well, this may be useful for times when you just want to record a program once at a specific time, but not regularly. Here is a sample shell script that can be called from cron:

Sample cron shell script

This is a very simple script that merely switches to a channel and records sixty minutes of a program to a date oriented filename. Place this in $HOME/bin of the user who will actually do the recording − since I am going to run it at 6pm, I'll call it recordshow6pm.sh.

```
#!/bin/sh
LD_LIBRARY_PATH=/usr/local/lib
export LD_LIBRARY_PATH
PATH=/usr/local/bin:$PATH
export PATH

DATE=`date +%m%d%y`
FILENAME=/path/to/myshow-6pm-$DATE.avi
v4lctl setstation 3
vcr -t 60m $FILENAME
```

Calling the script from cron

Now it's time to call it from cron, monday through friday at 6pm. To do this, run the crontab −e command as the correct user and enter the following line:

```
00 18 * * 1-5 /home/username/bin/recordshow6pm.sh
```

Calling the script from at

If you'd rather call the script from at, for one−time execution, you may instead do this:

```
at -f /home/username/bin/recordshow6pm.sh 18:00
```

---

4. Alternate Recorder − Creating VCD's for playback on DVD/VCD Players

4.1 Introduction to VCD Creation

I must thank Alexander Oelzant for creating this portion of the VCR−HOWTO. His original version is located at: README.bttv2mpeg.

After recording shows on my computer for a while, I realized it was much nicer to watch the shows on my full−sized television set than to watch them on my computer monitor. There are two options for doing this: 1) Purchase a video card with TV−OUT and run a cable to my television. or 2) Create a VCD and play it in my DVD Player. Since CD−R and CD−RW media is really cheap I decided to go this route.

This section could theoretically be done in a different HOWTO because it uses a different method for recording/converting than the other sections of the VCR−HOWTO use. This is primarily because I haven't figured out how to create VCD compatible mpeg's using vcr. If your goal is to create VCD's, use this section of the HOWTO. If you don't care about VCD's, completely ignore this section of the howto because these procedures require MUCH MORE disk space than using vcr to record for playing under linux.

4.2 Required Hardware for VCD Creation and Playing

```
1)A linux supported CD writer.
2)A bttv compatible TV Tuner Card (WinTV is one good example)
3)A VCD player or DVD Player
```

4.3 Required Software for VCD Creation

This is one method for creating VCD's under linux. If you have a better method, please let me know. The following list of software contains the versions I found to work well for me under Red Hat 7.1.

```
1)NuppelVideo 0.52a (nuvrec must be setuid root)
2)exportvideo 7e-pre4  (must be this version or later)
3)mjpegtools 1.4.1 (installed rpm found on rpmfind.net)
4)toolame 02h
5)mplex 1.1
6)vcdimager 0.6.2 (installed rpm found on rpmfind.net)
7)cdrdao 1.1.4 (rpm from redhat 7.1)
```

4.4 Procedure for creating a VCD

```
1)nuvrec -t _NUM_m _filename_
_NUM_m = size.  E.g. 30m = 30 minutes.
2)nuvplay -e _filename_.nuv | toolame -b 224 -m s /dev/stdin _filename_.mp2
3)exportvideo _filename_.nuv "|mpeg2enc -o _filename_.m1v"_
4)mplex -f 1 -s 2324 -p 1 -o _filename_.mpg _filename_.m1v _filename_.mp2_
5)vcdimager -l "Movie Title" -c _filename_.cue -b _filename_.bin _filename_.mpg_
6)cdrdao write --device _your_device_ _filename_.cue_
7)Eject the cd-r, stick it in the vcd player, press play and enjoy._
8)File Sizes From each step for 30 minutes of data._

Bytes       Filename      Created from step?  Can Delete after Step?
=====================================================================
1391756119  finefilm.nuv  1) nuvrec           2) toolame and 3) mpeg2enc
50401280    finefilm.mp2  2) toolame          4) mplex
259097824   finefilm.m1v  3) mpeg2enc         4) mplex
313793452   finefilm.mpg  4) mplex            5) vcdimager
120         finefilm.cue  5) vcdimager        6) cdrdao
318808896   finefilm.bin  5) vcdimager        6) cdrdao
---------------------------------------------------------------------
Total approx 2.3g for 30 minutes of sample data.
If you delete previous files after the appropriate steps, max used space
for 30 minutes of data was 1.7gb.
```

---

5. Further Information

In this section, you'll find more information on additional utilities or ideas for making a VCR work under Linux.

5.1 MyVCR Wrapper Program proposal

We need a wrapper program that provides us with the ability to do the following things (from a main menu)

- Archive recorded shows to CDR/CDRW/DVDRAM
- Play Recorded shows (From hard disk or prompt for the media!)
- Set record times for recording shows − use tvguide.com as a source for showtimes. A program that accesses tvguide.com for showtimes is: tvguide.com perl program
- Be fully configurable to used preferred recorder/player.
- See Kvdr as a possible place to start.

5.2 Alternate Recorders

- Slow−CPU Capture Program
- Vstream
- Qdvt

5.3 Recording Results

- Serge Wroclawski − 200mhz CPU is not fast enough.
- Brian Hayward − 900mhz Duron is fast enough.

- Brian Hayward − 875mhz Duron is fast enough.
- Stephen Moore − 500mhz Celeron CPU is not fast enough.

5.4 Other Suggested Ideas

- Describe recording from FM Tuner (radio) card and piping it to oggvorbiz or mp3encoder.
- Cable Descramblers: fscktv and CableTV.
- Figure out how to implement VCR+
- Check out the Video Disk Recorder Project − build your own digital satellite receiver.
- Check out the LinuxTV project.
- A Menu Driven Video Recorder: Kvdr

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6. Getting Help

Feel free to contact me if you have any questions. For product specific questions, you may also make use of resources for the specific application. As always, read the documentation for each product before contacting someone. I may be contacted at twivel@slothmud.org.

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7. Concluding Remarks

I hope this document has been helpful. If you have any ideas or improvements to this document, please feel free to contact me.

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8. Questions and Answers

This is just a collection of what I believe are the most common questions people might have. Give me more feedback and I will turn this section into a proper FAQ.

- Q:Why don't I get audio when playing back recorded programs?

  A: This could be due to several things. In order for audio recording to work, you must have the tuner card send output to the 'line−in' on your sound card. You must also use the mixer to enable the line−in on the sound card (if you hear sound while recording the show, it is probably enabled). I used to have my tuner card sound sent to my stereo receiver instead of the sound card, which was why I didn't get sound. Finally, it may be that the sound was record properly, but your sound device is in use by another program (esd, licq, xmms, etc).

- Q: Why is my video very jumpy?

  A: This may be due to a slow CPU. I currently haven't determined the exact requirements for recording with this method, I'm hoping user feedback will help me figure out what CPU is indeed required. I have a Duron 700 that seems to work fine, but I've heard that people with a 200−500mhz processor are unable to get smooth video.

- Q: Why is the audio/video out of sync?

A: This may be due to an incorrect FPS setting for your video type. For NTSC you will want to use 29.97. For PAL you will want to use 25. I still don't get perfect audio/video synchronization − but I can live with it. Hopefully this will improve over time.