

Xine-Player and ten DVD drives on Test **PRESENTING...**

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If you'd like to turn your home computer into a home cinema, apart from a fast processor and Linux-compatible DVD drive, you'll also need functioning software. We've tested ten DVD drives for you and present the free DVD player, Xine.

Users of SuSE Linux will have treasured their DVD drive for a while by now. When it comes to installation, instead of changing between six CDs, you now need only insert one DVD, and the considerably faster transfer rate compared with CD-Roms means a big reduction in the installation time. But nobody would dream of buying a DVD drive just to install or update their SuSE system. In the Windows world, too, DVD discs with data are still very rare.

The main application is obviously in the video domain. Why buy an independent DVD player for a few hundred pounds when you already have a computer with a TV output under your desk? Here you need only add on a DVD-Rom drive, which replaces the CD-Rom because of its backward compatibility, and install a software DVD player.

No peeping

This is where the problems start for Linux users: The data on a video DVD is encrypted with the *Content Scrambling System* in order to be able to bear the DVD logo. The encryption and decryption routines are kept under lock and key by the MPAA (Moving Picture Association of America) and licensed to developers of software and hardware players. This money making machine inevitably stalled when ingenious cryptographers cracked the algorithm and demonstrated that they could create functioning keys for a DVD within seconds. Which was not difficult. The main task was performed at the start of November 1999 in around three weeks by various groups. At the end of it, the DeCSS library had been

created, with which the data of a DVD encrypted with CSS could be decoded and stored on a hard disk. The complete history can be read on the Web pages of the Chaos Computer Club.

The MPAA has been protesting very successfully so far against the publication of this DeCSS library, and operators of various Web sites were forbidden from offering the program for download or even making links to other sites from which DeCSS could be downloaded.

DVD players under Linux

The fact that the legal situation has not yet been clarified completely has meant that so far there have been no DVD video players under Linux, so



[left]
Figure 1: The control elements are very clearly arranged. With the arrow keys on the right side the desired audio track can be set.

[below]
Figure 2: With the sound switched off the picture was perfect. Under XFree86 3.3.6 the film can only be played in the window.



ON TEST

DVD VIDEO UNDER LINUX

Table 1: DVD drive overview

Manufacturer	Hitachi	LiteOn	NEC	Pioneer
Model	GD-7500	LTD-122	DV-5700A	DVD-105SZ
Internet:	http://www.hitachi-eu-bsd.com/	http://www.liteonit.com.tw/	http://www.necd.de/	http://www.pioneer.de/
Connection: ATAPI	ATAPI	ATAPI	ATAPI	ATAPI
DVD/CD speed:	12x/40x	12x/40x	12x/40x	16x/40x
CD-holder:	Tray	Tray	Tray	Slot
DVD Performance Test:				
Average access time: [ms]	30.16	26.38	21.66	21.94
Transfer rate - linear reading: [Mb/s]	11.19	11.40	11.19	14.86
Transfer rate - random reading: [Mb/s]	5.04	5.59	6.13	7.07
Transfer rate - internal: [Mb/s]	6.88	7.09	7.00	9.28
Transfer rate - external: [Mb/s]	15.53	15.74	15.04	19.95
High street price: (approx.)	75	72	75	105

only individual files stored on the hard drive can be looked at. With Xine, though, a new project has come into existence, which as well as files in MPEG-1- and MPEG-2 format, also legally plays direct video-CDs and rare unencrypted DVDs.

The player has a control panel, which is separate from the display window (Figure 1), familiar from most Windows players. The control elements are arranged clearly, but are limited to basic functions such as Fast Forward, Rewind, Playback, Pause, Eject DVD and automatic reading in of video CDs and DVDs. A playlist is already implemented, but this did not work perfectly in the version (0.3.6) reviewed.

One important function is hidden behind the two arrows on the right edge of the control panel: This is where the audio channel to be used is set, and in the case of DVDs with several audio tracks, various channels are used to play the different

language tracks. The switchover does not occur immediately, you first have to interrupt the film with Pause before the alteration takes effect.

Apart from sources, RPMs, debbs and Slackware packages for Intel-based systems are available in the download section at <http://Xine.sourceforge.net>. We settled on the RPM package for i686, which played without any problem on a SuSE 7.0 Professional system freshly-installed from DVD. After that you still have to add two symbolic links, `/dev/dvd` and `/dev/rdvd`, which must both point towards your DVD-Rom. If you want to use Xine as a normal user, you should also grant the `video` group write and read permissions on the block device of the DVD.

Freeze frames...

On the first test computer, the Acer TravelMate 737

Diagram 1: Average seek time [ms] (<-- better)

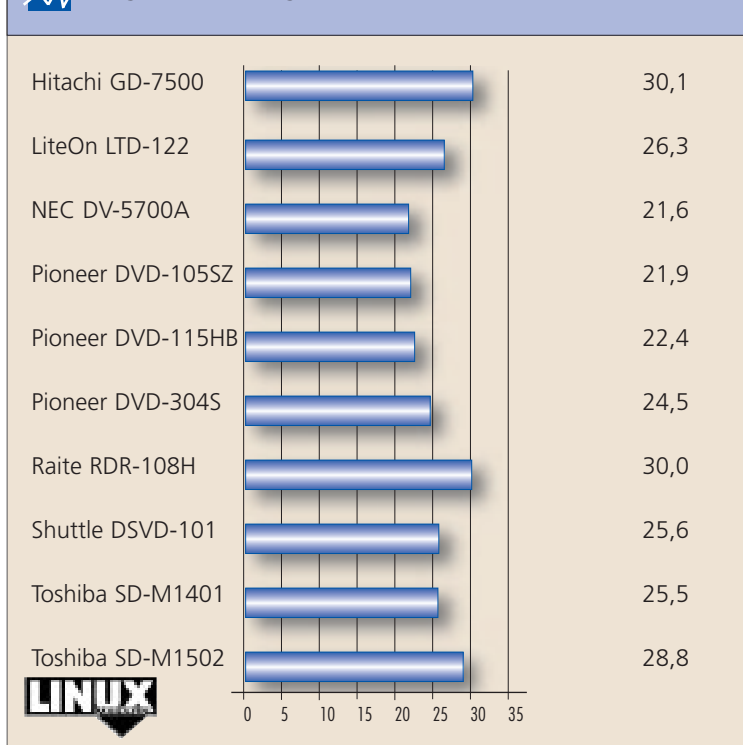
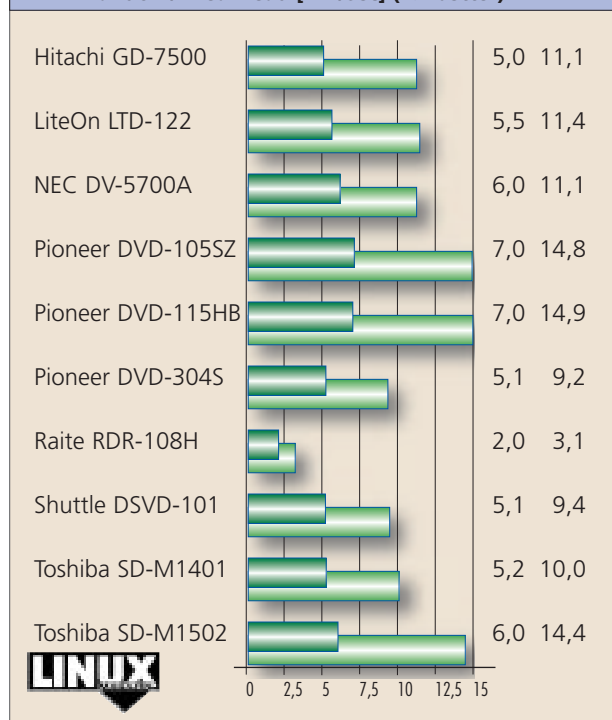


Diagram 2: Data transfer rates random/linear read [MB/sec] (--> better)



Pioneer	Pioneer	Raite	Shuttle	Toshiba	Toshiba
DVD-115HB	DVD-304S	RDR-108H	SDVD-101	SD-M1401	SD-M1502
http://www.pioneer.de/	http://www.pioneer.de/	http://www.raite.com.tw/	http://www.spacewalker.com/	http://www.toshiba.de/	http://www.toshiba.de/
U-SCSI	ATAPI	ATAPI	U-SCSI	ATAPI	
16x40x	10x40x	8x40x	10x32x	10x40x	16x48x
Tray	Slot	Tray	Tray	Tray	Tray
22.46	24.52	30.01	25.66	25.54	28.88
14.91	9.29	3.16	9.41	10.03	14.41
6.97	5.19	2.06	5.16	5.21	5.99
9.25	5.78	3.27	5.87	6.24	8.54
20.60	12.82	3.06	12.98	13.83	13.85
95	130	80	85	115	112

TLV (reviewed in the notebook group test in issue 5) there were some problems. The driver for the built-in sound card ESS Solo-1 is obviously not yet completely cleanly implemented, as when the OSS module of Xine was used, effectively only individual images could be seen, though on the other hand the sound worked perfectly. If the sound is completely switched off using command line parameters `-A null`, the picture in the SVGA server of XFree86 3.3.6 is almost jerk-free (Figure 2). The full picture mode of Xine, though, can only be used with XFree86 version 4.0 or higher.

We had more success with the Wortmann Terra Aura A74LD, which was also presented in the notebook group test. The picture was just not quite smooth and at times 'hung' for fractions of a second, although overall the film looked good. Surprisingly, there were problems with DMA mode: If this was activated, there were occasional display faults on the screen such as shaking and flickering, even with the sound switched off. In this case, as an exception, we advise deactivating the DMA mode of the DVD drive.

Pure film pleasure

To get a really smooth picture, you need an X-server with Xv support and if possible a driver with hardware support. We tested Xine under XFree86 4.0.1 and 4.0.2 with an Elsa Riva TNT 2 and Gladiate Geforce 2 GTS with nVidia driver. We also tested it with a Matrox G400 DualHead with the current MDA driver along with an ATI Radeon. Provided the corresponding hardware support is available, the rest of the hardware requirements are relatively modest: On our Pentium-II at 400 MHz we obtained a jerk-free picture and perfect sound with the Gladiate.

Another feature of X-servers with Xv-Support is the full picture mode. As usual, the entire desktop turns black and the picture is displayed centred. While other video players try to switch to a lower graphics mode, Xine uses the whole of the available picture size and scales up the film accordingly. This means a film can be

watched at 1280x1024 pixels, assuming the appropriate graphics and computing power is there. In Figure 2 you can see a still from Star Trek: Insurrection at 1024x768 pixels.

Coded DVDs

As already mentioned, Xine does not offer the option of showing encoded DVDs. This is a shame, as Xine functions well and even worked in dual head mode on the Matrox G400. Sadly there is no chance whatsoever of watching DVD videos legally under Linux. There simply is no licensed plug-in for Xine. This is a gap in the market, which will hopefully soon be filled. So it would be quite possible to offer a commercial CSS plug-in, which could be integrated into various video players. Even if this is not compatible with open source thinking, I favour

Diagram 3: Data transfer rates track inner/outer (MB/sec.) (--> better)

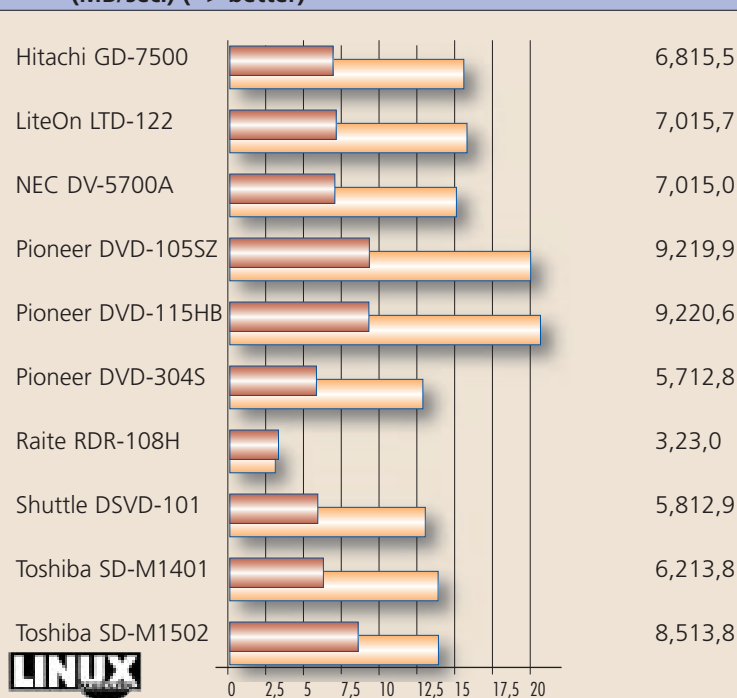




Figure 2: Pixel saturation: If the graphics mode set has a higher resolution than the film, Xine scales the full picture under XFree86 4.0 immediately up to full screen size

this solution – the release from CSS would obviously be better. But this does not seem likely. Until then, Linux enthusiasts with a hankering for DVD videos are technically criminals if they make use of illegal plug-ins such as the one from *Captain_CSS*. Because of the lack of a commercial solution we took a closer look at this module.

The latest version 0.1.1 works with both Xine 0.3.5 and 0.3.6 without any problem – it is not necessary to recompile the source of Xine. The plug-in can easily be installed into one of the RPM versions from the official Xine site. To do this, the tarball of the plug-in is unpacked and compiled. On our five test systems, this process went without a hitch.

For the test we started up the patched Xine from an xterm, to obtain any error messages from the plug-in. As it turned out, decoding did not work with every DVD drive, and of the ten devices tested we were only able to persuade the NEC DV-5700A and the Raite RDR-108H to co-

operate. The DVD drives of both notebooks also worked.

We inserted a DVD and clicked on *DVD* in the Xine panel. After a few seconds, the message 'GetTitleKey(): Failed' or even 'GetTitleKey(): Success' appeared, so the drive was unable to play back any encoded DVDs. Why the DeCSS code (which is actually independent of the drive) should only work with some devices was still unclear at the time of going to press. If the aforementioned message does not appear, the plug-in will work with the drive. But it is not possible to make copies of your films with Xine.

Naturally the plug-in can do nothing about the region code which has been set on the drive, American videos can thus still not be played back with a Region-2 player.

DVD drives on test

Let's get one thing out of the way in advance: We did not elect a test winner. Depending on the domain of application, several drives often come up trumps, but ultimately, apart from the runaway leader, Raite, they were all relatively close together. What is surprising is that the SCSI market is treated very much like a second-class citizen – drives with a DVD speed of over 10x simply could not be obtained. And prices for SCSI devices are very high for a markedly lower performance than is the case with ATAPI devices. This means even SCSI fans should consider whether they want to buy a drive, which is twice as fast at half the price with IDE connection.

Info

History of the CSS decryption by the Chaos Computer Club (CCC):

<http://www.ccc.de/tvdecrypt/dvd>

Site of the Xine project: <http://Xine.sourceforge.net>

Portable Alternatives: Linux Magazine 5, February 2001, page 34.

Hardware accelerated driver for Matrox G200/G400/G450:

<http://www.matrox.com/mgalsupport/drivers/latest/home.cfm>

DeCSS-plug-in for Xine from Captain_CSS: http://members.nbci.com/captain_css

Development of Linux DVD solutions: <http://www.linuxvideo.org>

All the ATAPI devices tested support UDMA/33, which we obviously activated for the benchmarks. With this, data rushed onto our hard drive at up to 20Mb per second, with the 4.4Gb on the SuSE DVD for example being read in by the Pioneer DVD-114HB in less than five minutes.

We found no great differences in terms of noise, only that the Toshiba SD-M1502 produced a slight howling as the result of the constant change of speed. This adjustment incidentally is also responsible for the low data transfer rate at the outer edge of the DVD, and just before the 4Gb mark the Toshiba achieved a glorious 19.45Mb/sec.

The data transfer rate for all drives is perfectly adequate for DVD-video, even if the DeCSS plug-in from Xine was only able to use the NEC and the Raite. In view of this the NEC DV-5700A would be our choice. Our measurement values can be seen in Table 1 and in diagrams one to three.

Prospects

We hope there'll soon be a legal way of watching DVD videos under Linux. The DeCSS plug-in has shown that it works in principle with ordinary hardware. A supplier would only need to provide (as for example with nVidia and

Matrox and their graphics drivers) a binary module for Xine.

The licence costs could even be recouped by selling the module. Until that time, DVD video under Linux unfortunately remains a ticklish subject. ■

So we tested:

All DVD drives with ATAPI interface were connected solo to the second UATA-66 channel (AMD IronGate 756) of the MSI-6167 mainboard. Before starting the test, DMA mode was also selected. For the two SCSI drives we used a Tekram DC-315U Ultra SCSI controller. As data media the DVD for SuSE Linux 7.0 Professional Edition and Star Trek: Insurrection (Regional Code 2) from Paramount were used.

When measuring the average seek times we were not content with just the time it took to position the heads (fseek) as this kind of measurement is not especially realistic. Much more telling is the time it takes to return the first data byte, which we accordingly read immediately after the Seek. To determine this we positioned the head in the middle of the DVD and moved it back and forth with a sequence of pseudo-random numbers. This sequence was the same for all drives.

The final measurement of the transfer rate was firstly done linearly over the entire medium, with blocks of 10Mb being read in each case. For the random read access, we used the same routine as that for determining the average seek time, but we now read 1Mb of effective data after each positioning.

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