Quick start

# NeroLINUX

Nero AG

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REV 2.01

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# 1 Preparing to use of NeroLINUX

## 1.1 Software Requirements

**NeroLINUX** has all the necessary functionality for recording CDs and DVDs built-in. However, for some special features **NeroLINUX** relies on some additional programs and packages installed on your system:

- The mpg123 software MPEG1-LayerIII decoder is used to allow recording of MP3 files on CD as regular audio tracks. Additionally, Gogo'n'Coda can be used to encode MP3 files.
- The ogg123 command line ogg-vorbis decoder as well as the oggtst package (available from the GnomeToaster Homepage: http://gnometoaster.rulez.org) is needed to be able to play and record ogg-vorbis files. Additionally, oggenc can be used to encode ogg-vorbis files.

**NeroLINUX** has dependency test functionality built-in and will tell you when it needs a program and cannot find it. A message will pop up in this case telling you the name of the package, the URL where it can be obtained and what purpose it has within **NeroLINUX**.

## 1.2 Hardware requirements

Recording CD-R/RW or DVD/RW puts a high load on your system's components. Although most state of the art systems should easily be capable of recording CD-R/RW or DVD/RW media perfectly well, the hardware requirements for CD recording should not be underestimated. Your CD/DVD-Recorder needs a continuous stream of data with interruptions only as small as can easily be handled by the onboard buffer provided by your recorder which is usually about 512kb to 2048kb. Depending on the recording speed, this can take less than a second to exceed.

For the graphical user interface of **NeroLINUX** you will need about 64MB of system RAM to record a CD-R/RW or DVD/RW. In fact, this amount of memory is too little as your X server also uses a lot of RAM.

Your CPU should be at least a Pentium III class 500Mhz CPU. Such a CPU is required to safely record *.mp3* files on the fly for example.

If your CPU or the medium your data is coming from is not fast enough to provide the content you want to store on a disc in real-time, **NeroLINUX** can cache data

on your hard drive. To make this possible, you need at least 700MB of free hard drive space.

## 1.3 Installing NeroLINUX

**NeroLINUX** is packaged in the *RPM* and *Debian* format. These formats are used by the majority of the Linux distributions. Please make sure you have administrative rights on your system before installing **NeroLINUX**.

To install **NeroLINUX**, open a terminal, go where your package is located and type the following command:

- `rpm -i nerolinux-<version>-<machine>.rpm` (RPM package)
- `dpkg -i nerolinux-<version>-<machine>.deb` (Debian package)

You can also use your distribution's software installer tool to install **NeroLINUX**.

These packages come with a post-installation script that is run automatically after all the files are successfully copied onto your system. This script will detect the Linux distribution you are currently using, and if the distribution is supported, it will add some shortcuts in the KDE and GNOME programs menu. With the Debian package, it will also add a shortcut to **NeroLINUX** in the *debian-menu* subsystem repository.

# 2 System configuration

Before using **NeroLINUX** you need to make sure that your system is correctly configured. Please read the following instructions very carefully to make sure that the first disc you record will be successful.

This chapter provides also some information about the way the Linux kernel internally handles CD and DVD recorders, and how **NeroLINUX** handles them.

Some sections of this chapter are a little bit technical but we have tried to make them easy to understand, even if you are not familiar with Linux environments.

**Please note that all the examples and commands that are shown can compromise your system security policy, especially when setting up the permission on the device files.**

## 2.1 Linux kernel version

### 2.1.1 Linux kernel version explanations

The kernel is the heart of your Linux system. It provides for example the low-level drivers used to access your devices.

In order to identify your devices filenames clearly, you need to first know the version of the Linux kernel you are currently using. To get it, open a terminal and type the following command:

```
uname -r
```

The output of this command should give you three numbers separated by periods (full stops), for example `2.6.7`.

- The first number is the kernel version (2 in our example).
- The second number is the kernel major number (6 in our example). All kernels that are considered “stable” have even major number. The kernels with odd major number are development kernels.
- The last number is the kernel release number (7 in out example).

The Linux kernel version is often identified by the first two numbers, as there is no significant change between two releases of the same kernel. So when you see for example *2.4 kernel*, it means *a kernel with a version number of 2 and a major number of 4*.

### 2.1.2 NeroLINUX requirements

In order to use **NeroLINUX** you will need at least a 2.4 kernel. To be plainly usable, especially with high-speed recorders like DVD recorders, a 2.6 kernel is highly recommended.

## 2.2 Devices configuration

Under Linux, all the devices are associated to one or more specific file(s) called *device file*. All the device files that are available on your machine are located inside the */dev* directory.

But, depending on the version of the Linux kernel you are using, your recorder device filename may differ, due to the low-level driver it is using. In this chapter you will find some explanations about discovering your device filenames and how to set access on them.

If you have enough technical competences, you can safely skip this section. In any case, if **NeroLINUX** detects that something is misconfigured on your system, it will warn you when starting.

### 2.2.1 Device filenames under Linux

Currently, you can have many different interfaces on a recorder: IDE, SCSI, USB or FireWire (IEEE 1394).

#### *2.2.1.1 IDE devices*

Actually, most internal recorders are connected to the IDE bus. Linux assign them a device file according to their position on this bus (bus number and master/slave settings). Basically, you should have the following naming convention:

- */dev/hda* : Primary Master device
- */dev/hdb* : Primary Slave device
- */dev/hdc* : Secondary Master device
- */dev/hdd* : Secondary Slave device

#### *2.2.1.2 SCSI devices*

SCSI recording devices are handled by two different drivers under Linux, and so two different device files are created to handle one physical device:

- */dev/srX* or */dev/scdX* : Used only to read data from media
- */dev/sgX* : Used by **NeroLINUX** to communicate with the device

(*X* is a number identifying your device)

If your recorder is correctly recognized by the Linux kernel it should appear in the file */proc/scsi/scsi*. Unfortunately, there is no way to determine the *X* number from the SCSI coordinates of your recorder. But usually, the numbers are used incrementally, starting from 0, corresponding to the position of the device in the */proc/scsi/scsi* file.

Sometimes, depending on your kernel configuration, one of these files can be unavailable. In order to have both, you should make sure that your kernel is configured with the following options:

- `CONFIG_SCSI` (SCSI support)
- `CONFIG_BLK_DEV_SR` (SCSI CD-ROM support : provides */dev/scdX*)
- `CONFIG_CHR_DEV_SG` (SCSI generic support : provides */dev/sgX*)

Usually all distributions are shipping a kernel configured with these options, so no need to worry. For more information about how to configure your kernel for recording CD or DVD, you can have a look to the generic Linux HOWTOs:

- CD-Writing HOWTO
- CDROM-HOWTO

#### *2.2.1.3 External devices*

As all external devices are associated with a virtual SCSI device, the filename scheme is the same as for real SCSI devices.

If you do not see your external device in the */proc/scsi/scsi* file after you plugged it in, make sure that the kernel is correctly configured. For more information you can have a look to your Linux distribution documentation.

### 2.2.2 IDE Devices configuration with 2.4 kernels

#### *2.2.2.1* 'ide-scsi' *driver*

With 2.4 kernels, all IDE devices that you want to be available in **NeroLINUX** must use the *ide-scsi* driver (even CD/DVD readers). This driver associates a virtual SCSI device with a standard IDE device.

Usually, Linux distributions automatically configure everything so that only recorders use this driver. In such a case, you will not be able to use your CD or DVD readers inside **NeroLINUX**. In such a case, the next session is useful.

How to make a device use the *'ide-scsi'* driver

Before trying to configure a device, make sure that you have configured your kernel with the following options:

- `CONFIG_BLK_DEV_IDESCSI` (SCSI emulation support)
- `CONFIG_SCSI` (SCSI support)
- `CONFIG_BLK_DEV_SG` (SCSI generic support)

Configuring a device, so that it will use the *ide-scsi* driver, is done by providing a specific argument *hdx=scsi* to the kernel command line. For example, if the device file corresponding to your recorder is */dev/hdb,* you will have to provide *hdb=scsi* to the kernel command line.

If you do not know how to do this, please have a look to your distribution documentation about how to pass options to the kernel at boot time. Please also note that most of the actual distributions provide some graphical fontends to modify the boot loader parameters:

- For *Red Hat Linux* run *ksconfig* (This application is called 'Kickstart Configurator'). When the application is running, click on 'Boot Loader Options' and fill the 'Kernel Parameters' field.
- For SuSE Linux, run *YaST2*, select *System* in the left pane and then double click on *Boot Loader Configuration*. Once the module is launched, click on *Edit Configuration Files* to set up the device parameters.

## 2.2.3 IDE Devices configuration with 2.6 kernels

### *2.2.3.1 Major changes in the device drivers*

With 2.6 kernels, the native IDE CD-ROM driver, called *ide-cdrom*, has been completely rewritten to use the latest technologies available and permit CD and DVD recording. This driver includes DMA acceleration that let you use high-speed devices (like DVD recorders) without any kind of problems.

One other important point is that in this version of the Linux kernel, the *ide-scsi* driver that has been used with old kernels has been deprecated. If you continue using this driver with a 2.6 kernel, your devices will not be available with **NeroLINUX** (Note that you will also have a warning from the kernel at boot time).

### *2.2.3.2 NeroLINUX requirements*

In order to use an IDE device with **NeroLINUX** under a 2.6 kernel, you must associate it with the *ide-cdrom* driver. In order to do this, you must check the kernel command line to be sure that no device is associated with the old *ide-scsi* driver (no *hdXX=ide-scsi* parameter).

If you do not know how to do this, please have a look to your boot loader documentation.

## 2.2.4 Setting correct permissions on the devices files

### *2.2.4.1 Static /dev support*

You need to allow user accounts to have access to all your disc devices. This is done under Linux by setting correct permission on the corresponding device filenames. In this section we will give you a way to correctly configure the permission on the devices filenames for *all* users of the system. If you are experienced with user rights management, you can skip this section.

To setup correct permissions on your device files, first make sure you have enough privileges to do so. Then, open a terminal and type the following command:

```
chmod o+r+w /dev/sg*

chmod o+r+w /dev/hdX
```

(where X is the letter corresponding to the IDE device)

You can run the last command more that one time if you have multiple IDE devices.

These commands will allow users to have read and write permission on all your SCSI generic devices (CD-ROM for example) and your IDE disc devices.

Another possibility, if you only want to give access to *some* users, is to create a new group called for example *nero* and change the group of the device files corresponding to your CD/DVD devices with it. Then give read/write permission to the group on these device files and finally, just add all the users that are allowed to use **NeroLINUX** to the new-created group.

#### *2.2.4.2 Udev support*

**NeroLINUX** supports *udev*, the new /dev file system implementation that are used in SuSE Linux 9.2 and Fedora Core 3 for example. The only thing that can appear is that a hot plug device that gets plugged in when **NeroLINUX** is already started is not recognized. In that case, just restart **NeroLINUX**.

With this file system, all permissions are set during boot time using some specific configuration files. So to make your modifications permanent, you have to change the files located in */etc/udev/*. For more details, you can have a look to udev FAQ.

### 2.2.5 Setting up DMA acceleration on IDE devices

DMA acceleration provides an improvement in throughput for the disc drives, and let you safely use all your recording devices. Depending on your Linux kernel and distribution configuration, you might have DMA acceleration that is automatically enabled on startup.

If your hardware supports it, it is generally a good idea to enable DMA acceleration not only for IDE hard disk drives, but also for disc drives such as CD/DVD readers and recorders. Please note that if one of your devices has no DMA acceleration, **NeroLINUX** will warn you when starting the application.

To enable DMA acceleration on one of your device, you can run the following command (as root):

```
hdparm -d1 /dev/hdX
```

(where X is the letter corresponding to the IDE device)

This settings is not permanent. If you want to enable DMA at boot time, you can add the command above in one of your startup scripts. As these scripts are distribution dependant, please check your distribution documentation to find out how to do this. Please note that most of the distribution have some graphical fontends to configure this.

For example, with *SuSE Linux* distributions, you can use *YaST2* to setup the DMA mode of your IDE devices. To do this, launch *YaST2* and select the *Hardware* item in the left pane and then double-click on *IDE-DMA Mode*. Once the module is launched, make sure that all your disc drives DMA mode is set to 'On'.

## 2.3 3rd Party System Tools Configuration

Some 3rd party system tools, like automounter utilities or new hardware detection daemons, can cause side effects when using **NeroLINUX**. As you have no way under Linux to lock a disc drive, these utilities can send commands to a drive when **NeroLINUX** is burning. In that case it can make your recording process fail.

Before using **NeroLINUX**, you must make sure that no other application is accessing the drive you plan to use for recording.

In this chapter, we give you a list of applications that can cause problems. Please pay attention that there might be some other utilities interfering with **NeroLINUX**: it is impossible to list *all* applications that bring errors!

### 2.3.1 SuSE Plugger / SuSE Watcher

This utility is shipped with SuSE Linux distributions. It automatically detects if new medium are inserted in a drive. If it is the case, it launches a specific utility, depending on the media type.

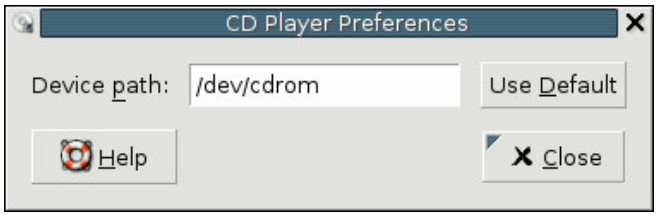
This utility can cause error during burn processes, especially when burning in Track-At-Once mode. So make sure that it is not configured to use your recorder. To do this, please check the SuSE Plugger documentation.

Note that you can easily disable these utilities. To do this, right-click on their icons and select 'Quit'. Those icons are located just beside the clock, on the right-hand side of the KDE panel.

### 2.3.2 GNOME CD Player Applet

As this applet is polling the drive it is connected to every second to see if it contains a playable disc, you should make sure that it is not configured to use your recorder.

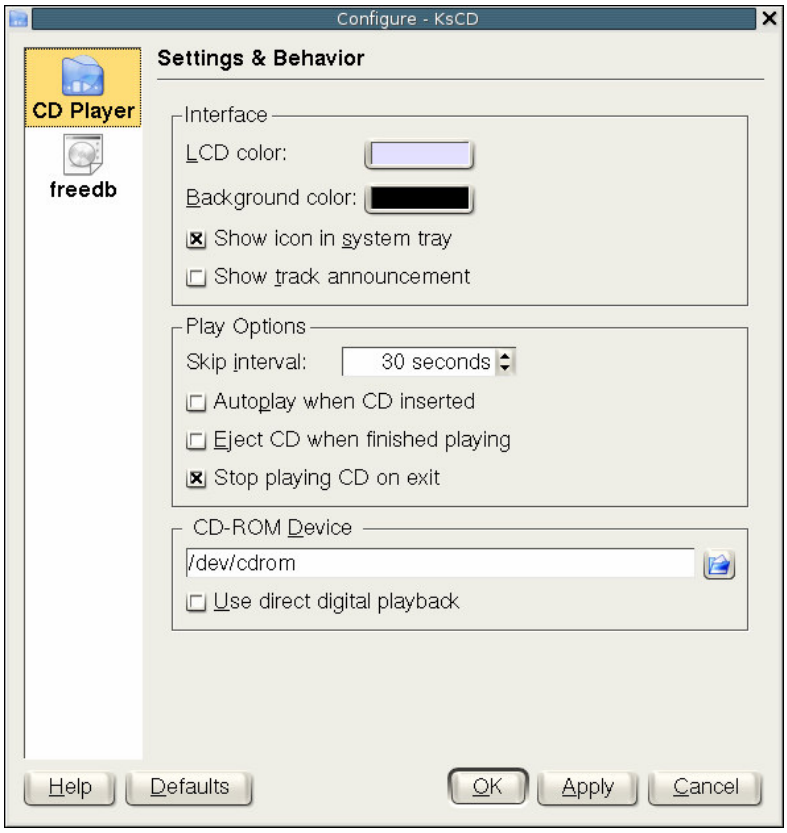
To do this, right-click on the applet and select the 'Preferences' item and make sure that the 'Device path' is not the device path of your recorder.



### 2.3.3 KDE CD Player

The KDE CD Player applet (also known as *kscd*) is also polling the drive it is connected to. Make sure that this utility is not configured to use your recorder.

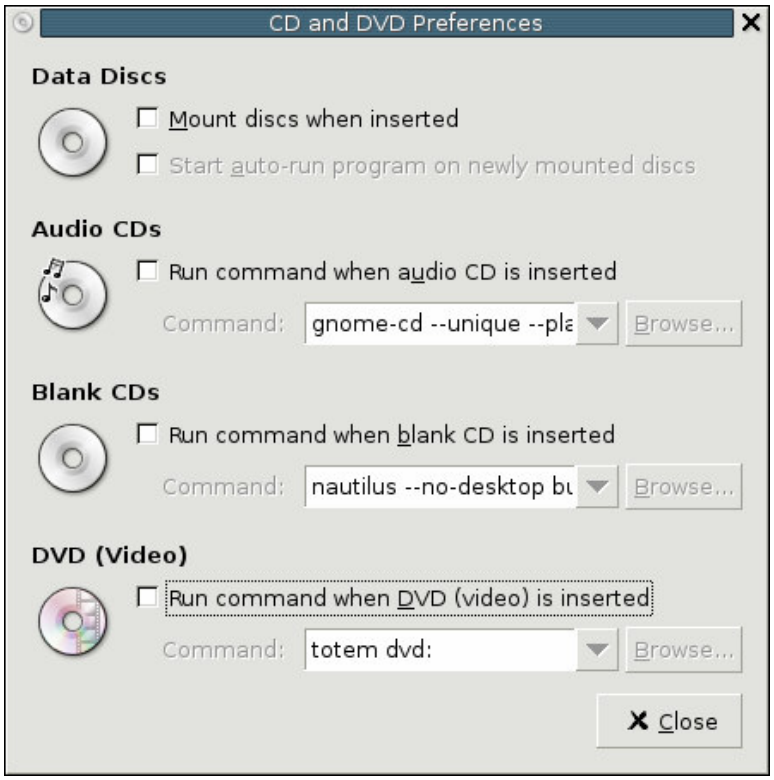
To do this, open the configuration dialog and check that the CD-ROM device prompted is not your recorder.




### 2.3.4 Magicdev

*Magicdev* is an automounter utility included in the GNOME desktop utilities, that polls every disc drives to see if they contain a useable medium. If it is the case, it will automatically be mounted. In order to avoid risks, make sure that this utility is not running when burning with **NeroLINUX**.

To configure *magicdev*, click on 'Start here' icon on your desktop, and select 'Preferences/Peripherals/CD Properties' or 'Desktop Preferences/CD and DVD' (It depends on the GNOME version you are using). Make sure that everything is unchecked, so that *magicdev* will never try to mount automatically a disc, or start a CD player application.




In some case, the *magicdev* process can still be running even if everything above is unchecked. In that case, you can safely ignore **NeroLINUX** warning message.

### 2.3.5 KDE Autorun daemon

*Autorun* is a daemon that is sometimes included in KDE. Make sure that it is not configured to run with your active recorder before burning with **NeroLINUX** otherwise you could get into troubles when burning discs.

To completely remove this daemon, just delete the 'Autorun.desktop' file in your '.kde/Autostart' directory. The *autorun* daemon will not be loaded the next time you log in.

# 2.4 Configuring NeroLINUX

## 2.4.1 Initial Setup and Quick Start

Start **NeroLINUX** from the account you are planning to run it in the future by typing *nero* on a terminal. If you have not set up your system for write access of users to the CD-Recorder device, you will have to use the root account. Please be aware that this is a potential security problem on your system. Please, see the previous sections and the FAQ for ideas on how to make your CD-Recorder accessible to normal users.

You will be prompted to enter your **NeroLINUX** serial number. Once the serial number has been correctly entered, you will be prompted to restart **NeroLINUX**.

**NeroLINUX** performs a drive auto detection at startup. Check that all your drives are listed in the 'Disc Drives' section on the bottom of the tree located in the top left part of **NeroLINUX**'s main window. If one or more drive is missing, have a look to the previous sections of this chapter to see if your system is correctly configured.

To select the recorder you want to use, select Recorder/Choose Recorder or click on the toolbar icon. Select the line corresponding to your recorder and click on 'OK'. The name of the recorder you selected should now appear in the right side of the status bar. Please note that when you double-click on the name of the active recorder a dialog pops up to allow you to choose another recorder.

For most configurations, this is all you have to do to get **NeroLINUX** up to date. The following sections will deal with some special cases.

## 2.4.2 Audio Setup

**NeroLINUX** has abilities to play audio streams with its preview player. You should also select the audio driver that **NeroLINUX** should use when previewing audio files. To do so, enter **NeroLINUX**'s Preferences window by choosing File/Preferences, and select 'Audio System' pane. A list of available drivers is presented, depending on the sound libraries installed on your system.

The sound libraries supported by **NeroLINUX** are:

- Open Sound System (OSS)
- Enlightenment Sound Daemon (esd)

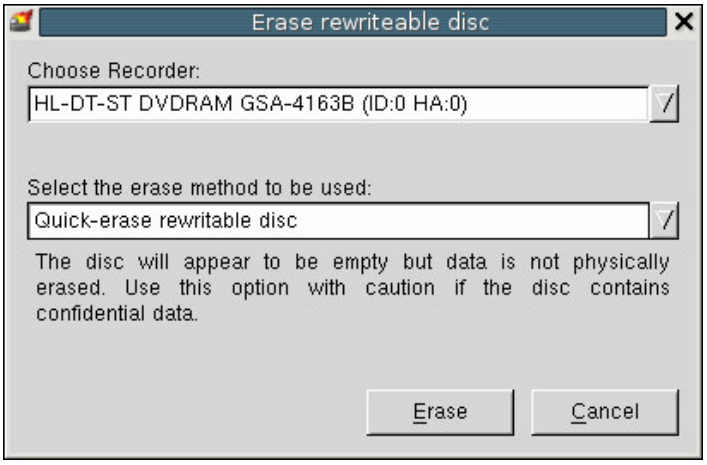
If you do not know which sound server you are using, have a look at the process list. If you see a process called *esd* you are using *esd*. If *esd* is not present, you should select *OSS* to be able to preview some sounds.

If you are using a sound card driver coming from the ALSA project, make sure that you have loaded the OSS compatibility driver. For more details about the ALSA sound drivers, you can have a look to the ALSA homepage.

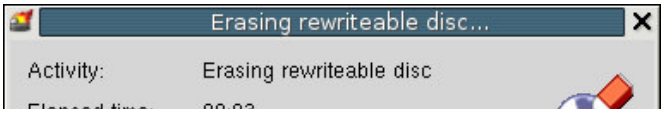
# 3 Basic functionality and Interface concept

Once you have setup **NeroLINUX** and the system it is running on, you will be able to record your first CD-R/RW or DVD/RW with **NeroLINUX**. However you should first test if everything is working. If you are using **NeroLINUX** with a CD-R/RW recorder, insert a blank rewriteable media and select 'Erase Rewritable Disc' in the ‘Recorder’ menu.

The following window should pops up.

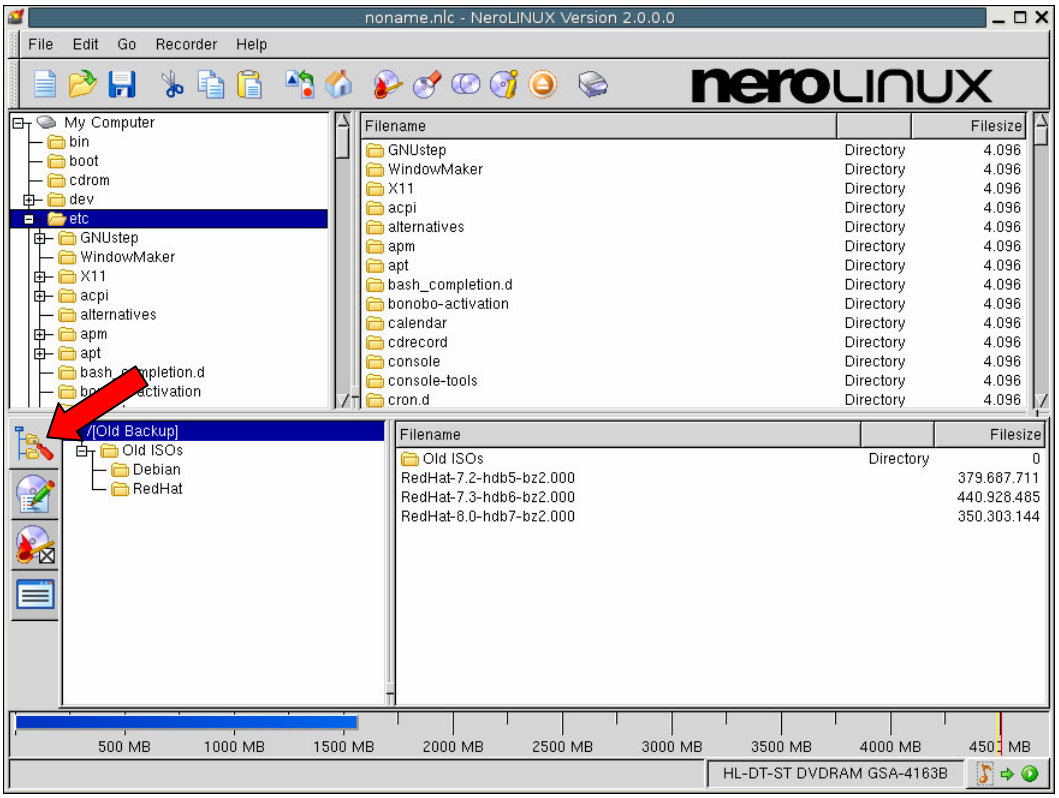



After selecting the clear mode you want and clicking on ‘Erase’, **NeroLINUX** should now show a dialog keeping you up-to-date about the blanking process which should disappear after a few minutes. Notice the recording terminal. It shows the output while blanking. If you see an error message there please check your configuration and consult the troubleshooting section of this document if you find something unusual.

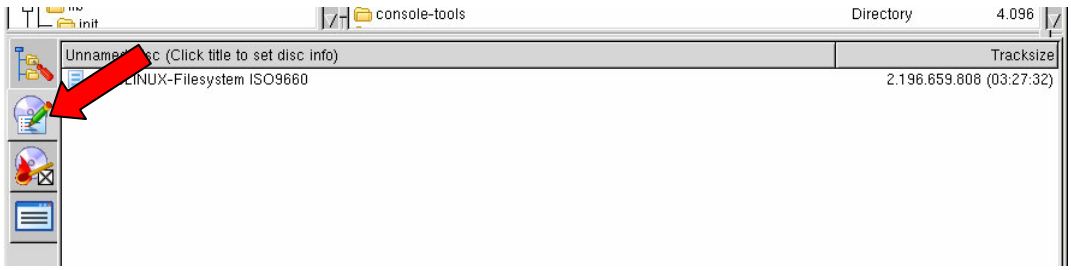


The following is a guide to the lower section of **NeroLINUX**'s main window.

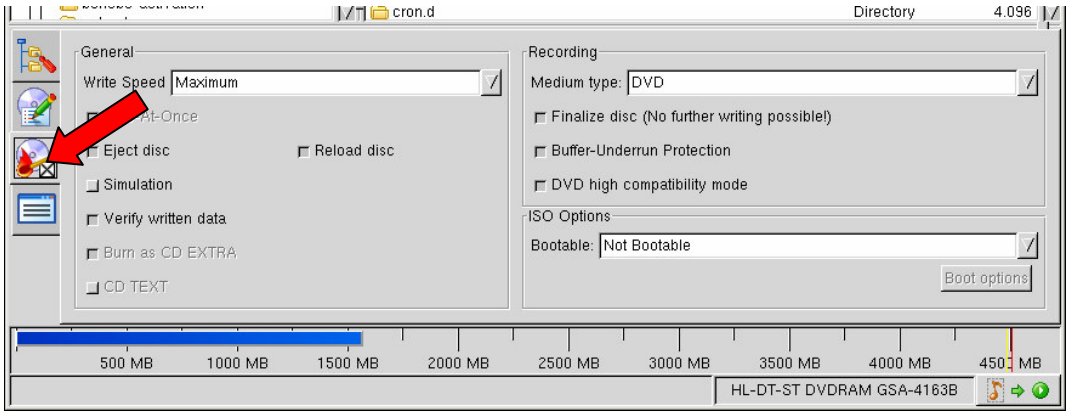
The first icon leads to a file manager which displays a **virtual file system**. Editing this file system (e.g. adding files, deleting files, creating directories) will not affect any file system or directory of your computer directly. What you are editing in **NeroLINUX**'s File system editor is just a prototype of a hypothetical data track on the disc you want to create.



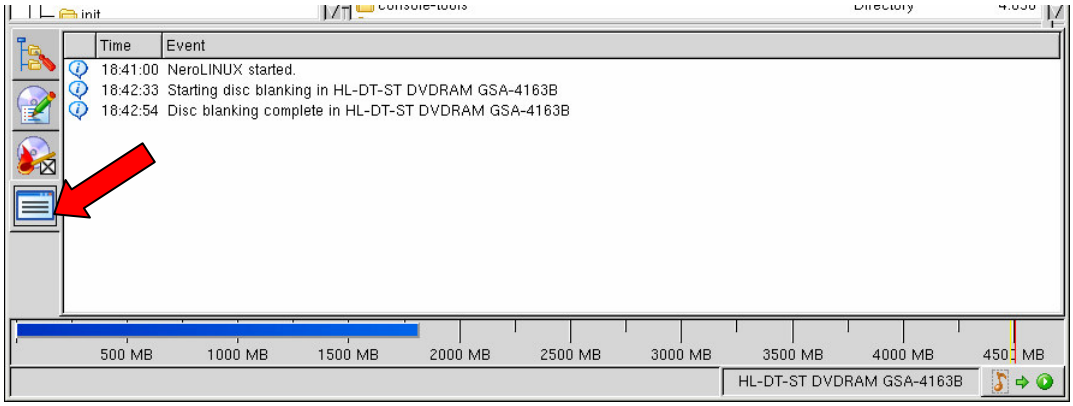

The second icon brings up **NeroLINUX**'s track editor. As with the file system editor, this is just a virtual list of tracks. It will become 'real' as soon as you press **NeroLINUX**'s record button.



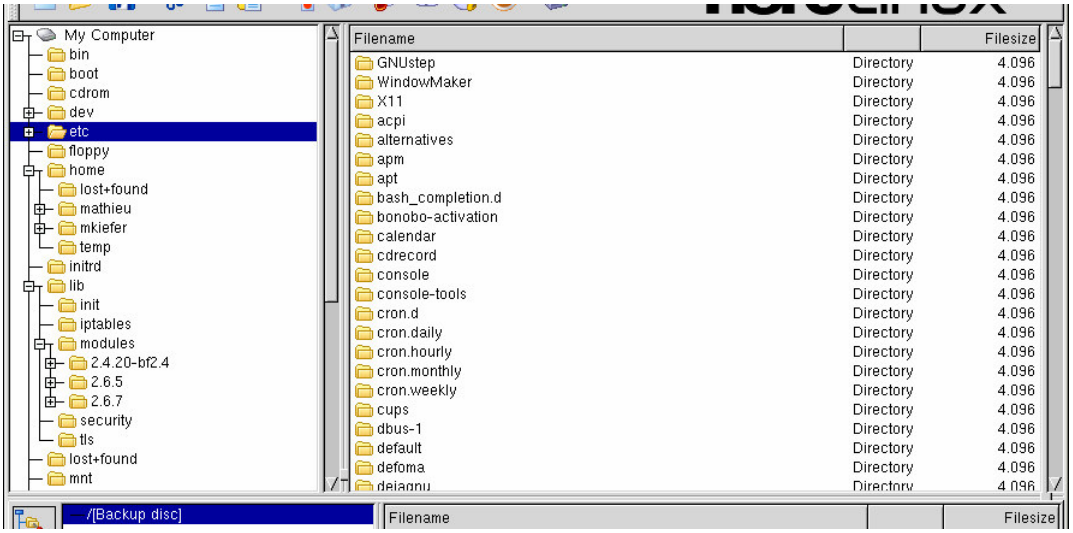
By clicking the second last icon you can reach a page with various recorder settings. You can use this page to adjust your recording settings to your needs, e.g. you can set the recorder speed, the type of lead-out you want to write, whether or not your CD should be bootable.



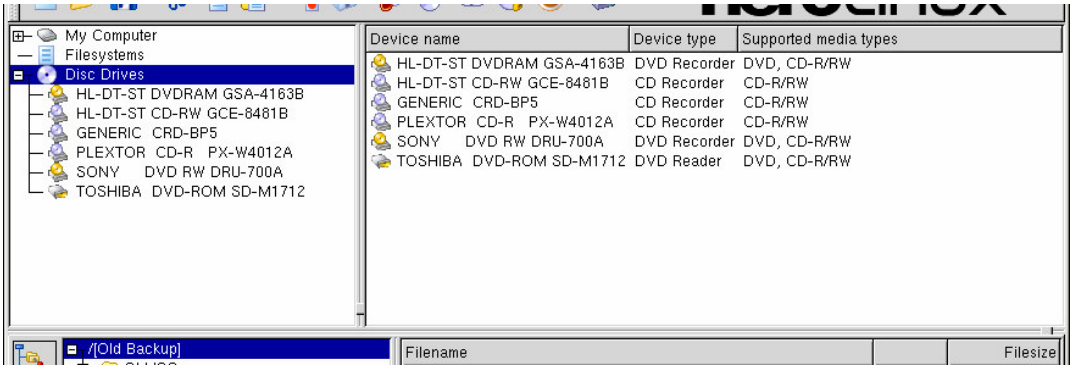

With the last icon you can reach the recording terminal page. This page contains a list of all messages coming from your devices, in order to keep you informed of what they are actually doing and their result.



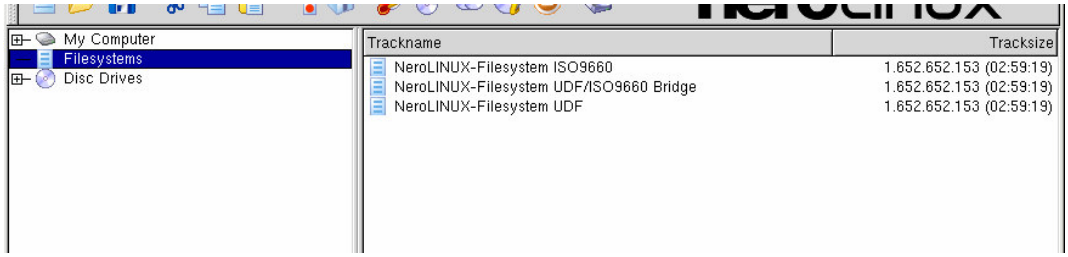

The upper half of the **NeroLINUX** window shows a list of *data sources*, notably an item called 'My Computer', one called 'Disc Drives' and one called "Filesystems'. Clicking the 'My Computer' item will make it expand into your directory structure starting at your system's root directory. Click a directory to make its contents appear to the right of the file system tree.




Expanding 'Disc Drives' will show a list representing the disc based units installed on your system. Clicking one of the drives will show a list of tracks of the medium in that particular drive.




Clicking 'Filesystems' will show the available file systems available for recording to the CD/DVD.

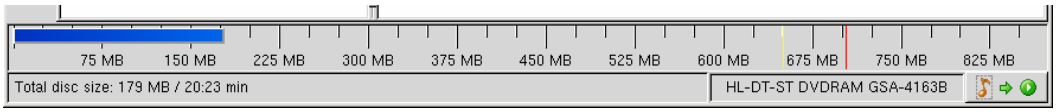


Generally, you can drag and drop any item showing up in the upper half of the **NeroLINUX** window into both the track editor and the file system editor of the lower half, with different results of course. That is also how you will create your CD-R/RW or DVD/RW.

Everything that is to appear as a separate track when the disc is inserted into your home stereo must be dragged into the track list, everything that should appear in the file system of **NeroLINUX** must be dragged and dropped into the file system editor.

If you *right* click on your mouse button **NeroLINUX** will automatically create a copy of the data you added on your hard drive. This can be useful when working with multiple removable media. Additionally to the source section, files may also be dragged into **NeroLINUX** from external sources like your favorite file manager.

The following features can be found on the bottom side of NeroLINUX's main window.




This part contains the compilation size status bar display. This bar is similar to the one in **Nero Burning ROM**. Some small differences are present:

- Tracks that are already on a CD are printed in light blue
- To change the units (Megabytes to minutes or visa versa) just double-click on the area.

Please note that if you are currently creating an audio CD, the compilation size status bar bar units will be automatically set to minutes.

Below the compilation size status bar bar, is the status bar. This bar will provide some help messages if you pass the mouse over an item on the screen e.g. a menu item. At the right side of this status bar, is the active recorder name, and the preview player. To use this player to preview an audio file, just drag and drop it over the player It will automatically be played if the external player for its type is available. (See **NeroLINUX**'s filetypes section for more details)

## 3.1 Making a CD or DVD from files stored on your computer's hard drive

This section describes how to record files (e.g. graphics files or other documents) on a CD-R/RW or DVD/RW. To write files to a medium simply drag and drop them from the 'My Computer' section into the upper half of the **NeroLINUX** window or from your favorite file manager into the file system editor (use the first in the list of icons to the lower left of your **NeroLINUX** window). You can delete files, create directories and rename files or directories by selecting the relevant files and right clicking on the mouse to display a menu containing several options.

If you select the **root item** of the file system editor's file tree and select rename, you can set your data track's **Volume ID**.

Please, make sure your file system is part of **NeroLINUX**'s destination track list. The '**NeroLINUX** File system' located in the 'Filesystems' folder in **NeroLINUX**'s source area is the track-representation of the virtual file system you just edited. The ISO file system is added to the track list automatically if it is empty when you start editing the virtual file system. If you want to write a different file system on your medium, just drag and drop one of the other available file systems into the track list. When you are finished, click the "Record" button in **NeroLINUX**'s toolbar. Notice that the recording options panel will also give you some control over the recording process. You can specify not to finalize a medium or to write a multisession TOC[7] . You can also select the writing speed and whether or not to eject and/or reload the medium after recording.

## 3.2 Burning images

It has become common to distribute software, esp. Linux distributions in the form of so-called 'Images'. These images can be in various format and **NeroLINUX** recognized ISO, NRG and CUE images.

To burn these files to a CD or a DVD using **NeroLINUX**, first make sure that the recording options are correctly set - especially the recording medium type - and then click on the 'Burn Image' item in the 'Recorder' menu. Select the image file you want to burn in the file selection dialog that pops up and click on 'Ok'.

Please note that some CUE files might not be burnable under Linux, due to some character case problems. If you encounter such a problem, just edit the *.cue* file and make sure the character case of the binary files is correct.

Please note that when you are burning an image, the following recording options are ignored, as they are part of the image file:

- *CD TEXT* (Part of the image file)
- Burn as CD EXTRA (Part of the image file)
- Bootable options (Part of the image file)

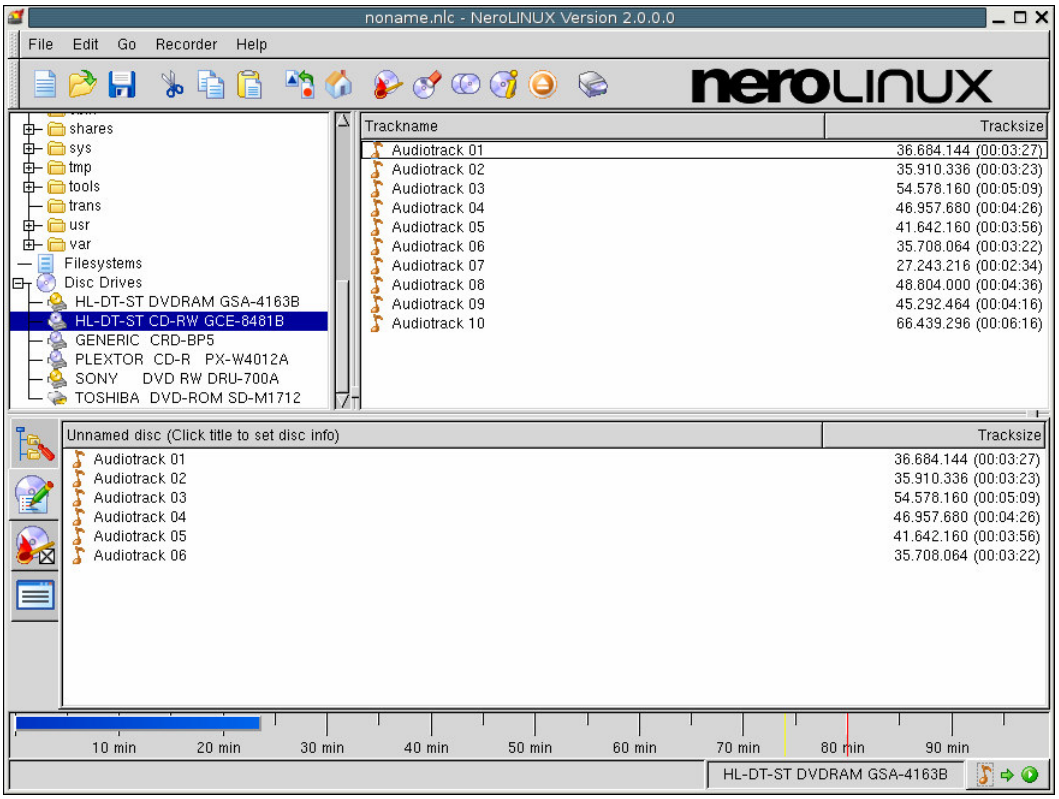
## 3.3 Making an image bootable

The boot structures of a disc following the *El-Torito* standard are part of the image file so whenever your image file is bootable the disc you create from it will automatically become bootable as well.

## 3.4 Audio CD recording (Creating CDs playable on your Home Stereo from other CDs, MP3, WAV etc.)

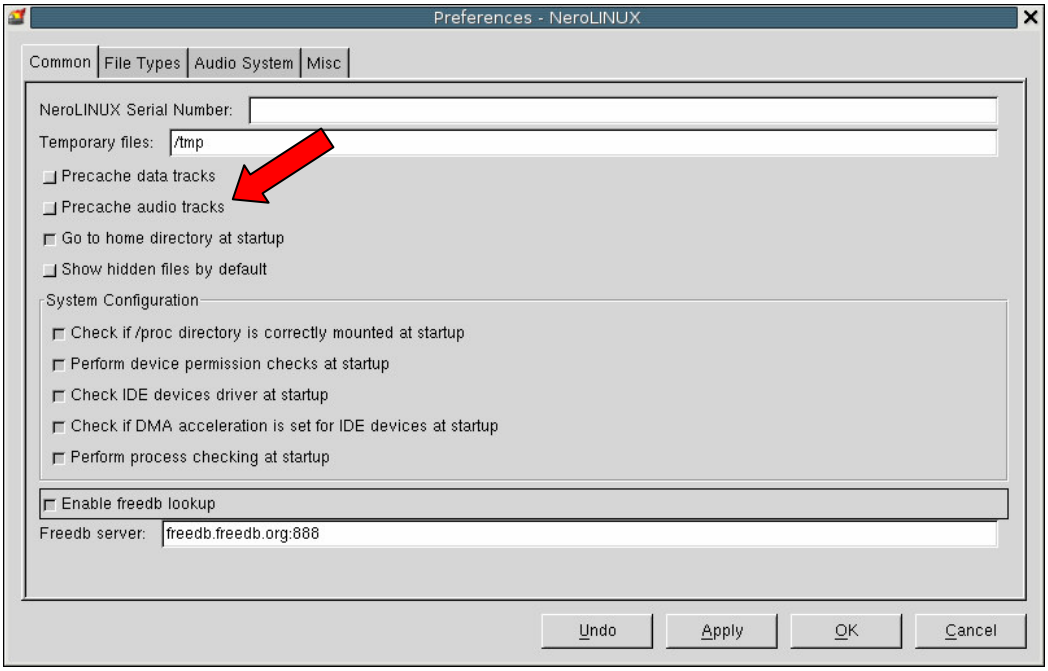
**NeroLINUX** provides two general methods for creating an audio track: you can build it from a file or taking an existing audio track from another CD.

If wish to build the audio track from a file, all you need to do is to select the audio file you want to record from **NeroLINUX**'s file system tree and drag and drop it down into the track list (the pane connected to the second icon in the destination area). You will see an entry being added to the track list reading the filename of the audio file it was built from and the audio track size in bytes to the right. Notice, that you can only use audio files that **NeroLINUX** can recognize. The default configuration supports MP3, OGG and WAV files but it is also possible to add others (see 'advanced configuration'). Note, that **NeroLINUX** needs some additional command line tools to be installed on your system to be able to work with MP3 and OGG files. See section “Software Requirements” for more details.




Taking an existing audio track from another CD is not really much different. Instead of selecting a file from the file system tree you select a track from one of the CD-ROM drives listed in the 'CD-ROM Drives' tree in **NeroLINUX**'s source area.

To copy audio tracks on-the-fly using **NeroLINUX** you must clear the 'Precache audio tracks' check box in **NeroLINUX**'s preferences:




You can also freely combine audio tracks coming from another CD and tracks created from MP3 files as you desire.

You can rearrange the tracks in **NeroLINUX**'s track list to make the playing order more interesting. To do so, drag the tracks around in the list and place them in your preferred order. The tracks are always inserted into the track list at the point where you release your mouse button.

Audio CDs created with **NeroLINUX** are playable with any audio CD-Player unless they are multisession discs (which might work with some players) or not 'finalized' (the lead-out has not been written).

**Please note, that not all types of media can be played on every CD-Player. Some older CD-Players might not be able to play CD-Rs because CD-Rs do not reflect the laser light as well as normal compact discs. Some DVD-Players cannot play CD-R/RW media. No CD-Player older than 5 years will support this medium type. Always consider the intended use of your burned CDs when choosing the medium type.**

***Important hint:*** **It is possible that NeroLINUX will sometimes not be able to calculate the playing time of an MP3, OGG or WAV file correctly. Especially concerning files containing small defects (e.g. an MP3 file transmitted over digital radio etc.). If you realize that the calculated playing time of your MP3 as displayed in the track list differs from its real playing time, drag and drop it into the track list with your right mouse button continuously pressed. This will make NeroLINUX precache your MP3 file which will make NeroLINUX know the real size of the raw audio stream as decoded by e.g. mpg123 or ogg123.**

Once you have arranged your track list you can select which recorder settings to use. **NeroLINUX** lets you choose from several recording modes.

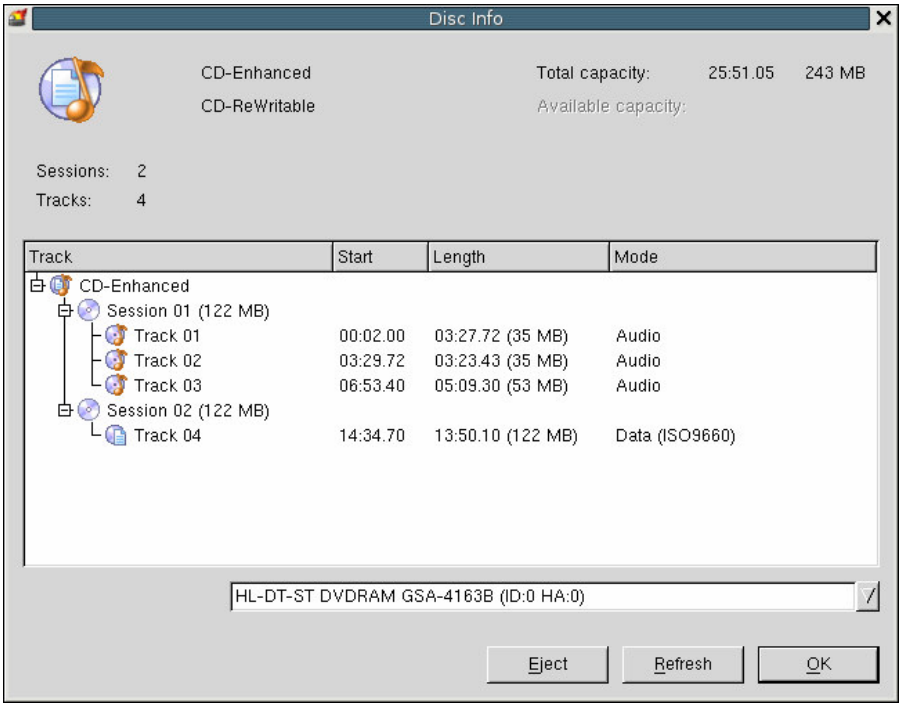
## 3.5 Recording Modes in NeroLINUX : How to use NeroLINUX for Disc-At-Once recording

The Disc-At-Once mode is the most elaborate recording mode for Audio-CDs. Only in Disc-At-Once mode is it possible to record CD-TEXT as well as CDs not containing a gap of 2 seconds between your audio tracks.

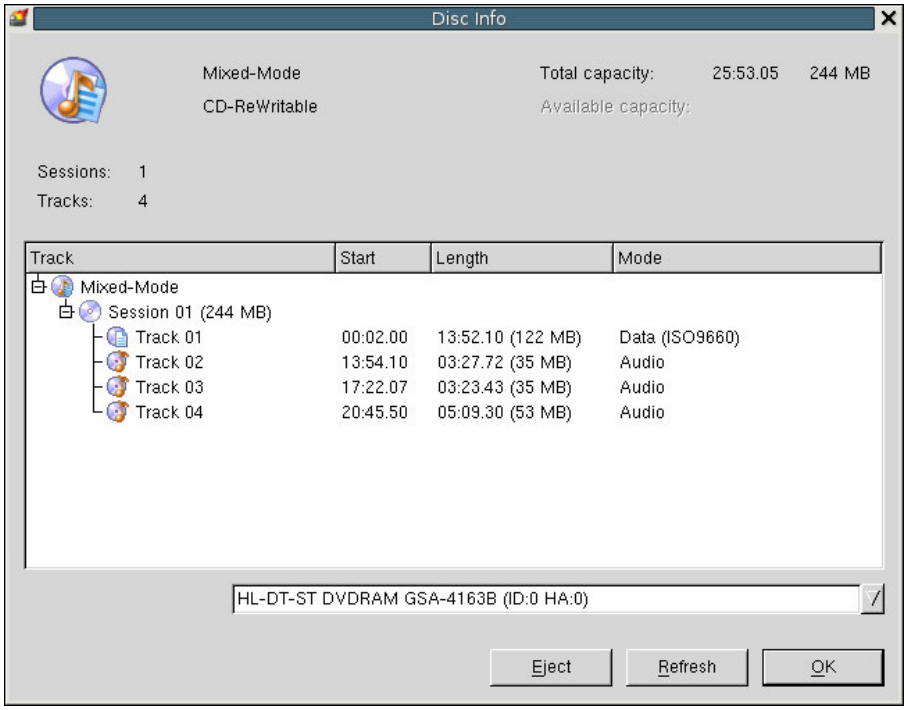
Track-At-Once is the mode of choice for data CD Mastering. It allows multisession discs to be created and works with a huge quantity of recorders, even the very old ones. To switch between both recording modes, simply check/uncheck the 'Disc-At-Once' flag in **NeroLINUX**'s recording options.

## 3.6 Creating a CD EXTRA or a Mixed Mode CD

CD EXTRA and Mixed Mode CDs are discs that contain audio tracks and also a data track. The difference is that CD EXTRA can be played back on your home stereo, as the data track is located at the end of the disc, on a separate session.




In case of a Mixed Mode CD, all the tracks are located in one session and the data track is always the first track on the disc.



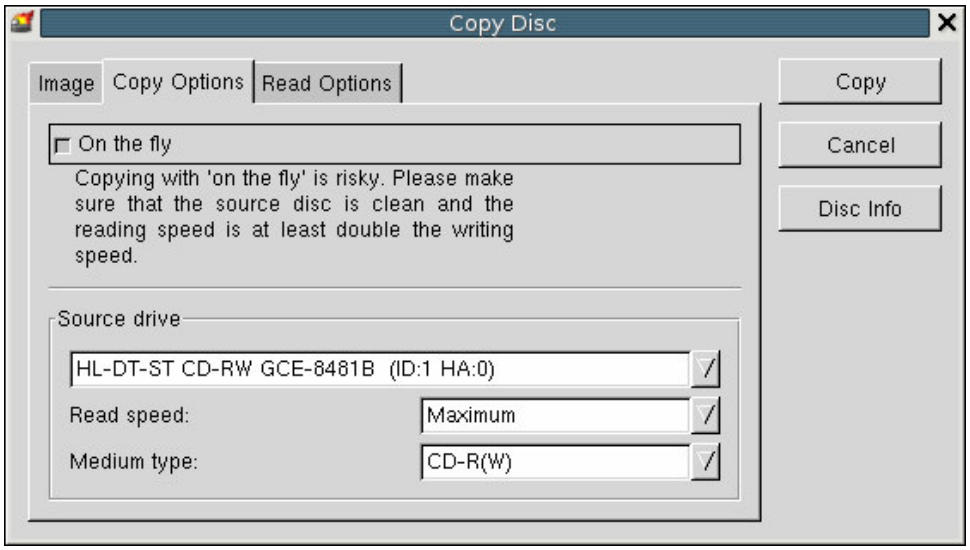

The process of creating a CD EXTRA or a Mixed Mode CD with **NeroLINUX** is a mere combination of the steps described in Section 3.1 “Making a CD or DVD from files stored on your computer's ” and Section 3.4 ”Audio CD recording (Creating CDs playable on your Home Stereo from other CDs, MP3, WAV etc.)”.

Remember, the data track edited in **NeroLINUX**'s file system editor can be found in the 'Filesystems' section of the source area. Add the audio tracks you need to the track list.

After that, check the ‘Burn as CD EXTRA’ check box in the recording options pane. This check box is only active when a compilation contains both data and audio tracks. If you want to burn your CD as a CD EXTRA, just make sure that this option is set. In the other case, your CD will be written as a Mixed Mode CD.

## 3.7 How to copy a CD or a DVD

To copy a CD or a DVD using **NeroLINUX**, make sure that your recording options are correctly set and then click on the ‘Copy’ button in the toolbar or select the ‘Copy Disc…’ item in the ‘Recorder’ menu. The following window appears :




On this window you can find different panes that let you set up your copy parameters:

- On the first one, you can select the temporary image parameters. This image will be used when you do not want to copy a media on the fly.
- The second pane lets you select the copy options. Make sure the source device and medium type is correct.
- Finally the last pane shows you some read options.

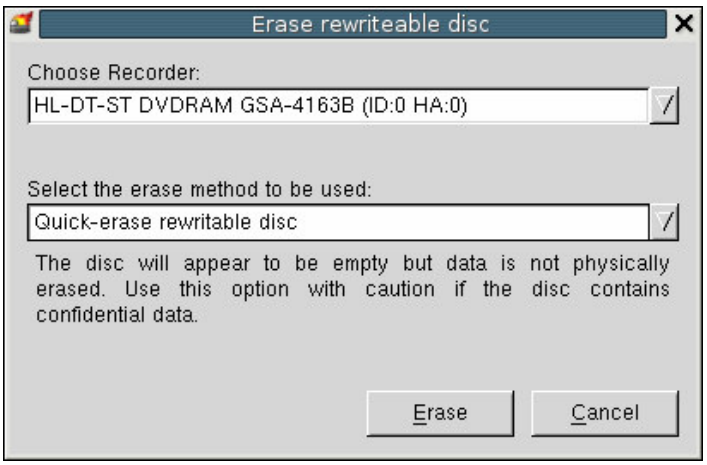
Once you have selected the correct settings for the disc you want to copy, just click on the ‘Copy’ button.

If you have a doubt about the media inserted in one of your devices, just click on the ‘Disc Info’ button.

## 3.8 Working with rewritable media

You can work with rewritable media the same way as with normal discs within **NeroLINUX**. There is really just one thing you will need in addition to the normal functions if you are using rewritable media: disc blanking.

To blank a rewritable medium with **NeroLINUX**, select the 'Erase Rewritable Disc' item in the ‘Recorder’ menu. Note that **NeroLINUX** supports two ways of blanking discs: a *full blank* and *TOC only blank.*




- A full blank means that all data on your medium will be erased. Depending on your recorder's speed this can take as long as your disc's maximum playing time.
- A TOC only will fool the recorder into seeing a blank medium when really just the first few sectors are blank. Clearing a disc this way is takes less than a minute with modern recorders.

# 3.9 Managing multisession discs

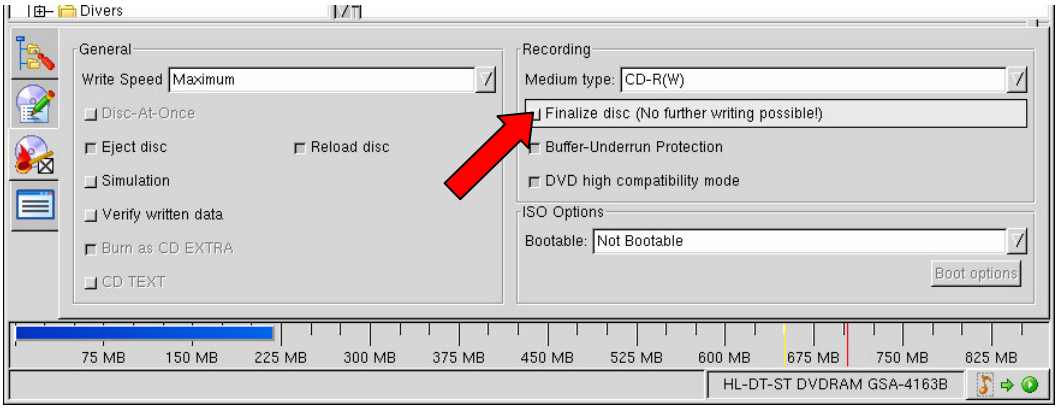
The following section will explain how to create multisession discs.

## 3.9.1 A introduction to how Multisession is done in general

When the first CD-ROMs were released, there were no CD-Recorders and there was no way to alter the contents of a written CD. There was no way to append files to backups done with the CD-Recorder, even though there was visibly more space on the disc. Because the CD was traditionally a write-once medium, there was no easy way to just append data to it. The result was that a slightly modified type of TOC was created, containing an additional field with a pointer beyond the currently written area of the CD so CD-Recorders would know where to continue writing.

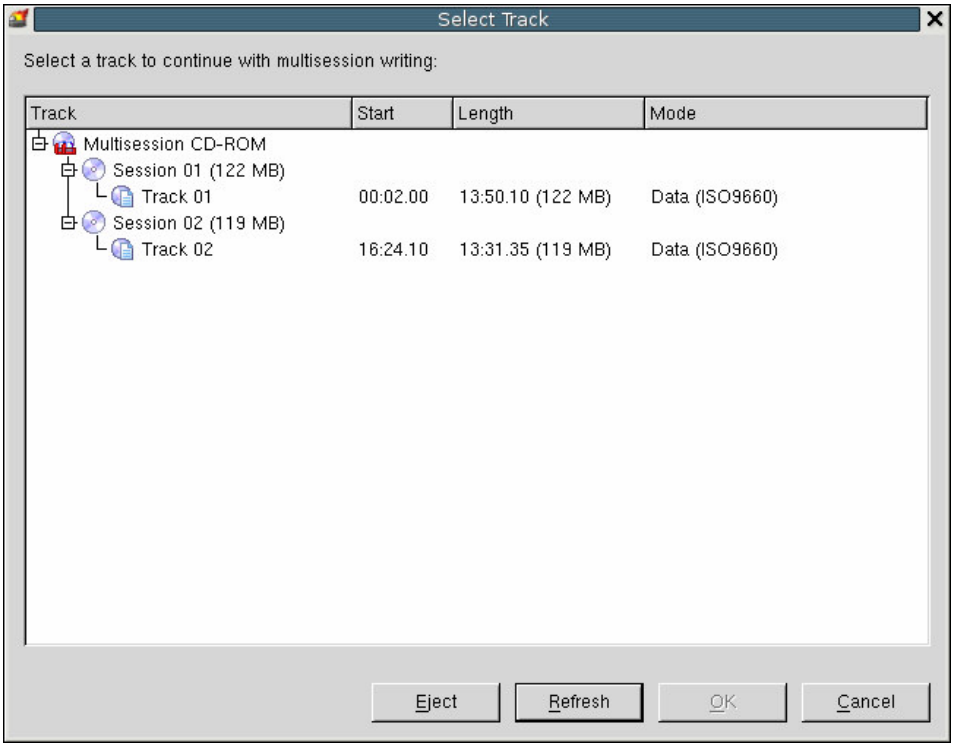
## 3.9.2 How to start a Multisession disc

In order to create a multisession disc, first, edit your file system as described in section “Making a CD or DVD from files stored on your computer's ”. After clear the ‘Finalize disc’ check box in the recording options.

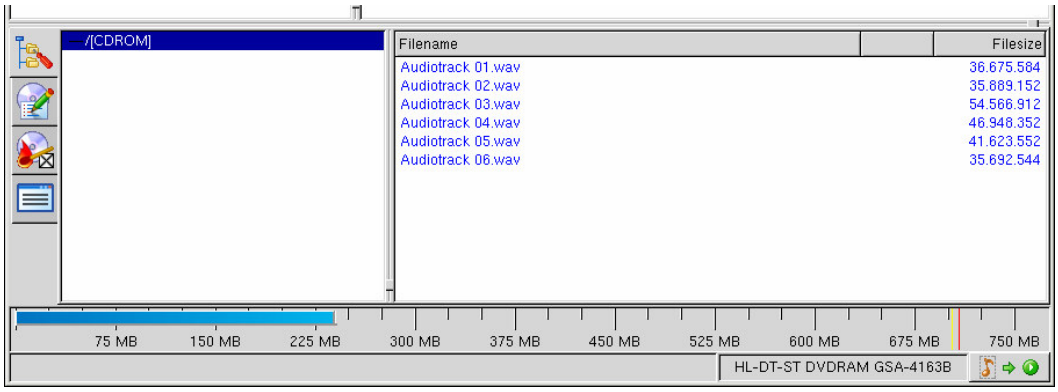



## 3.9.3 How do I append to a multisession disc?

Insert the multisession disc you want to append data to into your recorder and click the 'Import' button in **NeroLINUX**'s toolbar or select 'Import session' from the 'Edit' menu. You will then be asked to select the session you want to import with the following dialog box. Please note that until you choose a valid importable session the ‘OK’ button will be disabled.




As soon as you have chosen the session you want to import, click on ‘OK’. After a few seconds the contents of the imported session should appear within the file system editor. Note, that all files from the previous session are marked in blue in order to distinguish them from files from the session currently being edited.



You can replace files from the previous session, in which case their color will change to black or you can rename or delete files from the previous session.

When you are finished editing, click on record. You can repeat this process until all available space on your disc has been consumed if you leave the ‘Finalize disc’ option unchecked.

Be aware that every session on a disc will require approximately 15 MB of additional space for the lead-out stored separately for every session. Try to collect any files on your hard disk and write them to the CD collectively to save space.

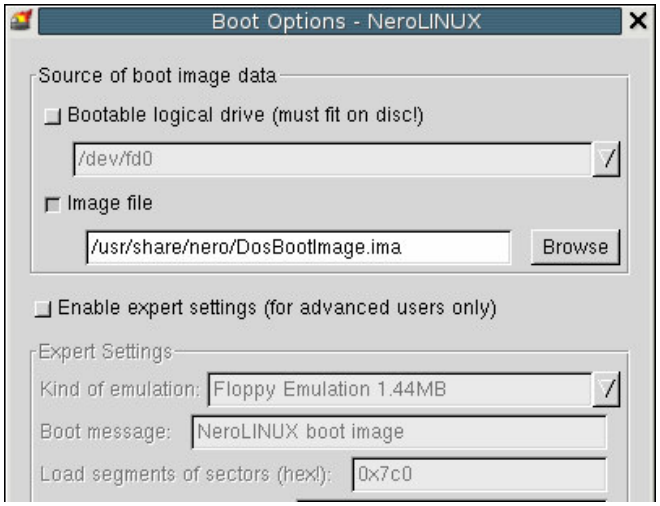
# 4 Advanced functions

## 4.1 Creating a bootable CD or DVD

Bootable media according to the El-Torito standard is the standard for creating bootable discs for standard PCs. Using the floppy emulation mode, your PCs BIOS provides some basic CD-ROM access functions that can read out an image file of a bootable floppy disc stored on your disc.

Using this image, your BIOS will transparently emulate a normal floppy disc in this mode of operation, e.g. when making your disc bootable using an image of a DOS boot disk, this image will be visible to your system as drive 'A:' once booting is done. Note that floppy emulation as well as any other emulation only works as long as the BIOS is being used to access your disk drive.

With this concept in mind it should be pretty easy to create a bootable disc with **NeroLINUX**. Select *El-Torito bootable disc* from the 'Boot' options in the 'ISO Options' section and click on *Boot options*. In the dialog that appears you can then either select an existing image file of a bootable device, like a DOS boot disk, or you can select a bootable partition to create a boot image on the fly. If you have some special needs, you can fine tune the options for creating the bootable disc in the ‘Expert Settings’ sections of the boot options dialog.



Note, that you do not need **NeroLINUX**'s bootable media creation capabilities in order to make a disc image bootable. Those images are either bootable out of their own right or they are not. See Section 3.3, "Making an image bootable" for further information.

## 4.2 The concept of Precaching

It is less common that people find themselves in the situation where they cannot record an MP3 file to a CD because their computer simply cannot manage to decode the MP3 stream as fast as their recorder needs its raw audio stream. But just imagine you want to make a copy of a very old, worn out compact disc . No CD-ROM drive will be able to read those CDs accurately within a time that would satisfy your recorder.

In **NeroLINUX**, there is a way around this. You can enable precaching for a particular track type in **NeroLINUX**'s 'Preferences' which will then apply to any track of that type. Alternatively, you can hold down your right mouse button when dragging your files/tracks to the Track Editor. This concept also works for the file system editor. Just imagine you want to create a backup of an old word processor's installation discs. 1.44" Discs have always been inclined to forget about their contents after a few years. Precaching the whole ISO9660 file system will not prevent this because you need to change discs quite a few times while creating the file system. Again, the solution is to just hold down your right mouse key while adding the files on your discs, which will make **NeroLINUX** precache those individual files.

## 4.3 Track to file conversion

While functionality to convert tracks to files is provided by most CD recording programs, few let you decide as accurately as **NeroLINUX**, how you want them converted. If you want to store your favorite audio CD's contents on your hard disk as MP3 files, you can do the following: Drag and drop any track down to the file system editor and it will be converted into its **default file type** automatically. Dragging it with the right mouse button pressed will prompt you with a popup menu to choose a specific file type to be created.

If you do not want to add your track to the file system editor but want to store it into a directory on your hard drive, you can select all the tracks you want and press the right mouse button. Simply select 'Encode Track as ...' in the popup menu. You will be prompted for a destination directory and the file type you want to convert to. *Note that encoded files will automatically get their filenames set appropriately if your computer is connected to a freedb server. ID3 Tags will be set only if a tool called MP3info is installed on your system. Currently, only the track editor, not the track lists in the source area have a popup menu attached to them. In order to convert a track to a file you have to drag and drop it into the track editor first.*

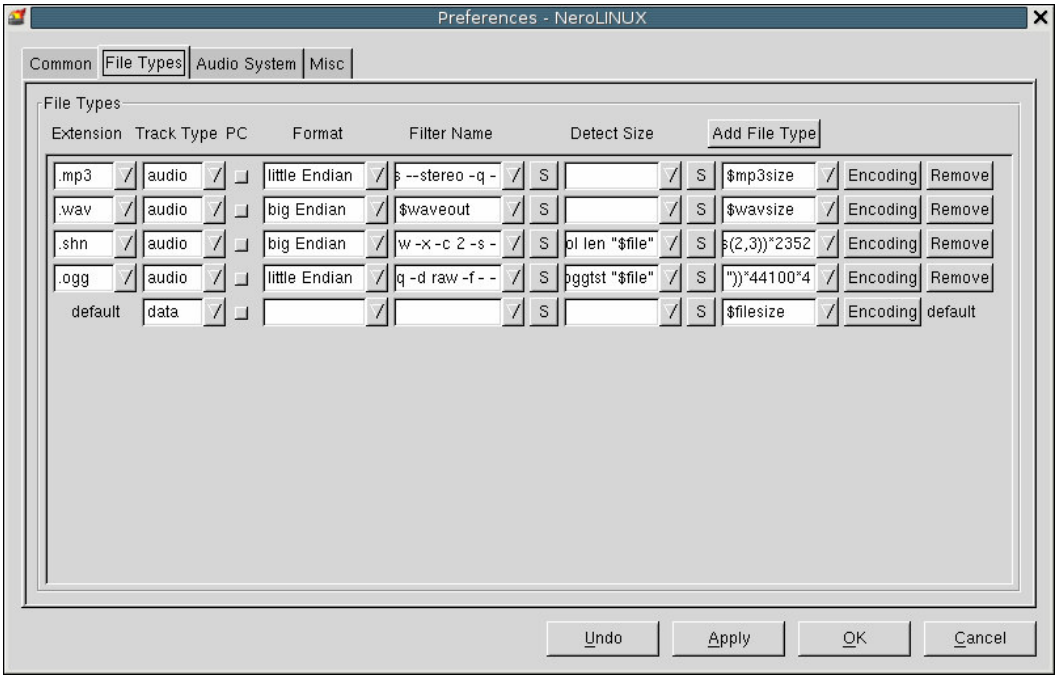
***Hint:*** You can also use **NeroLINUX**'s file conversion scheme to convert existing files of a certain type on your hard drive. Just drag and drop the files you want to

convert down to the Track Editor. This will convert them into tracks. Just follow the steps above to convert to whatever file type you want.

## 4.4 Adding a new file type to the NeroLINUX file types registry

**NeroLINUX** supports a very versatile way of burning arbitrary (mostly audio) file types to a CD or DVD. All you need to do to let **NeroLINUX** make an audio track out of an audio file is to specify a command line program capable of converting files of the desired type into some raw 16Bit, 44.1 KHz, and Stereo sound signal apt for CD recording. The following chapter will explain what to do if you want to implement support for an unsupported file type in **NeroLINUX**.

**NeroLINUX** can convert arbitrary files directly into a track on the medium that is to be mastered. To accomplish that, **NeroLINUX** has a 'File types registry'. Imagine this as the somewhat modified idea of a Mime-Type database, specifying decoders for each of the referenced file types. You can reach **NeroLINUX**'s file types registry by entering the preferences and selecting the 'File Types' pane.




**NeroLINUX** has an entry in this list for each file type supported. By default, you will find an entry for MP3, ogg-vorbis, WAV, and shorten. Basically, **NeroLINUX** needs to know two important things about your file :

- the decoder to use for
- how to calculate the track size

### 4.4.1 Specifying the decoder

This first point splits up into some basic information about the type of data your decoder plug-in will deliver and what **NeroLINUX** is to make of it.

First, is the **Track Type**: It can be one of **data** or **audio** and will tell **NeroLINUX** which type of track it is to create. The **PC** flag specifies whether **NeroLINUX** is to precache files of this type prior to burning. If your recorder does not support some way of buffer-underrun protection and is rather fast, it can easily happen that your computer is unable to decode e.g. an MP3 file quickly enough. Just turn on the PC flag in this case and everything is alright.

Next, **NeroLINUX** needs to know which **endianness** the output of your decoder has: Unfortunately, this may depend upon your system's endianness, e.g. mpg123 will output **little endian** on Intel compatible systems while it will output **big endian** on e.g. PowerPC systems. Either way, **NeroLINUX** has to know about the endianness, otherwise you will hear nothing but static. *Simple approach: If you hear static while trying to preview your track, change the endianness in your decoder settings.*

Now for the most important thing: you have to specify the name of a command line tool capable of decoding your file type. Ideally, it should be able to receive its input through stdin and send its output to stdout. In most cases, it is sufficient if sending output to stdout is supported. You can specify $filename in this case which will be replaced by the respective file on your hard drive.

Note, however, that future extensions like burning directly from ftp servers will not be supported using that scheme. The output produced by your decoder must be 16Bit, Stereo, 44.1 KHz. If your decoder cannot create this type of signal, you can use a chain of decoders to accomplish that goal by specifying multiple command line decoders, separated by the '|' (piping character).

### 4.4.2 Calculating the track size

Calculating the track size is extremely important for on-the-fly recording as **NeroLINUX** has to know how big the track is going to be prior to actually decoding your file. To find out about the track size, **NeroLINUX** has a few built-in methods referenced by $filesize, $mp3size and $wavsize. All three of them are pseudo-variables which change their value according to the track's properties.

Apart from that, **NeroLINUX** supports calling an external program to detect the track size and provides basic parsing functionality for arbitrary output. The last two fields in a decoder entry are responsible for that.

- The first one specifies the command line program whose output is to be parsed
- The second one specifies the function used to translate the output into a number representing the length of the track in Bytes.

While the first field may remain blank if you do not need an external tool for track size calculation, the second field must always contain a function resolving to the track size in bytes.

If you need to specify an external tool for track size calculation, the first thing you will have to do is to setup the calling syntax for that program. Enter what you would type on the command line to retrieve e.g. the playing time of your file with

the filename replaced by '$file'. Do not forget to include the quotation marks as well. These are required in case the filename of your file contains spaces.

You must then parse the output of your program. Apart from a few mathematical functions like *abs, int, sqrt, sin, cos, tan and C-Style boolean operators,* **NeroLINUX** supports two powerful ways of retrieving your command line tool's output:

- *getpos(y,x)*
- *regexp('regular expression').*

As the latter will always produce strings as its function result, you have to use the *strval('string')* function to convert a string to a number. The basic idea of this whole concept is that you can assemble the track length in Bytes from the output generated by your external program using some mathematical function. For example, if your command line tool will generate the following output if called with

```
tracksizetool -filename '$file':
```

*Tracksizetool Version 1.03, Copyright 2001 by Arthur Dent*

*Playing time of file '/home/ghost/something.ext' is*

*00 Hours, 2 Minutes, 23 Seconds, 43 Frames*

You can use the getpos() function to calculate the track size. To understand what this function does,, imagine the output generated by tracksizetool as a grid of numbers: getpos(3,1) will return '00' in our example. getpos(3,2) will return '2' and getpos(3,3) will return '23'. Generally, getpos(y,x) will return the x-th number in the y-th line of output. Consequently, we can get the number of frames with getpos(3,4).

One frame is 1/75th of a second and 2354 Bytes of audio data. So if you know all you need to know about our file now: the following function will resolve to our track size in Bytes (for the 44.1kHz,16 Bit, Stereo stream required by **NeroLINUX**):

((getpos(3,1)*3600+getpos(3,2)*60+getpos(3,3))*75+getpos(3,4))*2354

Enter this line into the last field of your file type registry entry and the process is complete. On the other hand, not all command line tools will create output parseable by the getpos(y,x) function. In this case, you need to use the regexp() function. Suppose our output will look something like:

*Tracksizetool Version 1.03, Copyright 2001 by Arthur Dent*

*Playing time of file '/home/ghost/some08minuteslongfile.ext' is 00:08:03.23*

This is an example of a particularly awkard filename as it contains numbers as well and will confuse getpos() when retrieving the different parts of our playing time. So you use a regular expression for this. The result of the regexp('exp') function is always the first part of the expression put into brackets, e.g. regexp('.*:([0-9]*):.*') will return the minutes part of our playing time for the output above as a string. Pass this through the strval() function and you have what you want. For the example above, the track size calculation function will read something like this:

((strval(regexp('.* is ([0-9]*):[0-9]*:[0-9]*.[0-9]*$'))*3600+strval(regexp('.* is [0-9]*:([0-9]*):[0-9]*.[0-9]*$'))*60+strval(regexp('.* is [0-9]*:[0-9]*:([0-9]*).[0-9]*$')))*75+strval(regexp('.* is [0-9]*:[0-9]*:[0-9]*.([0-9]*)$')))*2354

Note that each of the specified time fragments is being put into brackets once.

# 5 Frequently asked Questions

Some things just cannot be covered in the standard documentation. Unfortunately the documentation is the last place the average user looks for a solution to their problems. Here you can find answers to some FAQ's or Frequently asked Questions about **NeroLINUX**

## 5.1 Audio CDs created with NeroLINUX are playing fine on my computer but are not recognized by my stereo

Make sure you have toggled the 'Finalize CD' check box in **NeroLINUX**'s recording options pane while creating your CD. Scan **NeroLINUX**'s recording terminal for eventual error messages while finalizing your disc.

If none of the above applies, you are probably using a very old CD-Player that cannot handle CD-R/RW discs. Unfortunately the only solution to this problem is to upgrade your CD-Player. Some DVD-Players are not capable of handling CD-R/RW media while they are capable of playing regular audio CDs. This is just one of the many things you should take care of when buying a DVD-Player.

Finally, some very bad quality blank CD-Rs cannot be read by some audio CD-Players. This is because the organic layer used for recording you music is very thin on those CD-Rs and your CD-Player's laser might look straight through it. Using a lower recording speed might sometimes solve this issue.

## 5.2 When writing audio files, I get a lot of silence at the end of the track or I get tracks that consist of nothing but silence

This generally means that the audio file you tried to record was corrupt in some way. Although *mpg123* tries hard to play defective MP3s, it will sometimes get out of sync and stop playing entirely.

Please also check whether your distribution links from mpg123 to mpg321, which is a free replacement of mpg123. mpg321, is currently not as stable as mpg123 and will most of the time make NeroLINUX crash.

## 5.3 When copying audio tracks from other CDs, I get nothing but silence or the tracks seem to be incomplete

See question “When writing audio files, I get a lot of silence at the end of the track or I get tracks that consist of nothing but silence” for possible reasons for this behavior.

## 5.4 I can't write multisession discs

Please follow the instructions of the “Managing multisession discs” section in the **NeroLINUX** manual.

## 5.5 I can't hear anything when dragging an audio file or a track to the preview player but recording works perfectly well

There is probably a problem with your system's or **NeroLINUX**'s audio configuration. Please enter **NeroLINUX**'s preferences setup and change the audio output driver. ESD mode only works if the Enlightenment sound daemon is running in the background.

If you still cannot hear anything, please check your system's sound setup (e.g. if the kernel sound module is being loaded correctly) and make sure that no other applications are blocking your sound hardware.

## 5.6 NeroLINUX is making awful noises instead of playing tracks

This is probably due to a misconfigured Enlightenment Sound Daemon (ESD) on your system. To solve this problem you should switch from 'Enlightenment Sound Daemon' to 'Open Sound System' in the ‘Audio Setup’ pane of **NeroLINUX**'s preferences dialog.

## 5.7 NeroLINUX keeps recording a 2 seconds pregap between tracks which is inappropriate for the type of content I'm recording

Please check the 'Disc-at-once' option in **NeroLINUX**'s recording options.

## 5.8 NeroLINUX seems to be notoriously trying to open a network connection to some server. Does it have some sort of built-in Trojan transmitting my data to some remote database?

This is just the freedb routine trying to identify the CDs in your disc drives. You can deactivate this routine in the preferences dialog of **NeroLINUX**.

## 5.9 I tried to burn a disc with a few files on it. When I clicked on record, NeroLINUX went through all the files and recorded them onto the disc. However, I cannot mount the result. What went wrong?

You probably added your files to the Track Editor rather than the File Editor with the result that **NeroLINUX** created a CD containing several data tracks each being a copy of one of the files you added (just as if those files had been track images). Add your files to the file system editor and your media will work correctly.

## 5.10 NeroLINUX is running fine on my root account but it only causes error messages if run from my normal user account or it doesn't display any tracks for my CD-ROM drives. Aren't Linux users supposed to do their daily work as a normal user?

True. However, **NeroLINUX** requires the user to have access privileges to the devices which are not granted to normal users by default within any standard setup.

See “Setting correct permissions on the devices files” section in the **NeroLINUX** manual for more details about how to do this.

## 5.11 Burning a DVD takes too much time

This is probably due to the fact that you are using a 2.4 kernel and that your DVD recorder is configured to use the ‘*ide-scsi*’ driver. Updating your kernel to a 2.6 one and then configure your DVD recorder so that it uses the ‘*ide-cdrom*’ driver should solve this problem.

## 5.12 My external USB/FireWire recorder hangs when recording a disc

This is due to the USB/FireWire driver controlling your device. Updating your kernel should solve your problem. You can have a look to your Linux documentation for more details about kernel updates.

## 5.13 My USB recorder hides another device when it is plugged in

This is due to the kernel USB mass storage driver that is buggy. Updating your kernel should solve your problem. You can have a look to your Linux documentation for more details about kernel updates.

## 5.14 I get the error message “HDIO_SET_DMA: failed: Operation not permitted” when I try to enable DMA acceleration

This is a Linux kernel problem. Update your kernel and make sure that you have support for your IDE chipset and for DMA acceleration on all type of devices.

# 6 Support

**Useful links**

Nero AG Homepage

Online Shopping

Updates

# 7 Glossary

## Buffer underrun

To burn a CD, there must be a continuous flow of data. If the data stream between the computer and the recorder is so small that its internal buffer is empty, the writing process is interrupted, as there is no data available to write to the CD.

## CD-Text

As well as audio data, there is space on the CD for a wide variety of additional information, such as text describing the title and artist on each track. Currently very few audio CD players have a CD text function. If an audio CD player does not support CD text, it can play CDs with CD text in the same way as it does "normal" audio CDs without CD text. This is possible because the additional CD text information is stored before the start of the audio data in the lead-in area of the CD.

You must have a CD recorder which supports CD text in order to be able to write CD text to a CD. You can only write CD text in DAO recording mode (disc-at-once). You can find out whether your recorder supports this feature in the **NeroLINUX** 'Choose Recorder' dialog box.

## CD-Extra

CD-Extra is a Blue Book standard recording format. It was previously called CD-Plus and CD-Enhanced (Enhanced CD). This format has none of the disadvantages of standard mixed mode CDs. On mixed mode CDs the first track always contains an ISO file system, which means that audio CD players cannot play the first track of this type of CD. In contrast, CD-Extra has two sessions.

The first session contains up to 98 audio tracks conforming to the Red Book standard. The second session contains the ISO track with the ISO9660 file system and the directories CDPLUS and PICTURES. This means that CDs in CD-Extra format can be played on both CD drives and audio CD players, as the second session cannot be "seen" by the audio CD player.

## CD-i

The CD-i format (Compact Disc Interactive) was developed by Philips and Sony and is described in the Green Book. This format is particularly suited to the creation of interactive multimedia applications. These applications consist of sub-

programs which can access animations and video and audio sequences. Usually special players with television screens are used to play CD-i media.

## DAE

DAE is the acronym for Digital Audio Extraction. This means that the music tracks on audio CDs are read in digital format. This is also referred to as audio grabbing. Not all CD-ROM drives can read music in digital format. Generally, CD-ROM drives read music tracks in analog format (via the sound card). Using the **Nero CD/DVD Speed** program, you can measure the DAE quality of CD drives.

## Dependencies

Most program packages coming with a Linux Distribution rely heavily on other packages. For example, The Gimp, the well-known UNIX image editing program, requires a library called GTK+ which contains code to visualize dialogs, buttons etc. In a Microsoft Windows(TM) environment most software packages provide all the libraries they need themselves. Those libraries are usually copied into the Windows system directory by the installation routine, a process which not only requires the user to reboot his machine once the installation procedure has finished but also increases both the lack of stability of your system and the size of the software package you want to install. Just imagine two different programs using the same library in different versions. As windows cannot handle different versions of the same DLL files effectively, one program ends up overwriting the library of the other with the consequence that one of the two will usually become very unstable or will refuse to start at all. To overcome this problem in a Linux(TM) environment, shared libraries are usually separated from the programs using them and put into a different library. To avoid a situation in which a program is installed that needs a certain library which is not, the program's package will have a dependency set to the library it needs somewhere in the package header. Thus, the package manager program knows what it takes to make the program run and can either refuse to install the program or try to install the missing library as well.

## Disc-at-Once

This is a write process which does not create links between the individual sessions. The recorder starts by writing the lead-in, which is followed by the data and the lead-out. This process is used primarily by manufacturers of audio CDs.

Disc-at-Once/96 is an extension of Disc-at-Once which gives the software better control of the burning process. This mode is preferable, if it is available.

## DVD

DVD stands for Digital Versatile Disc. It was originally referred to as Digital Video Disc.

The purpose of developing DVDs was to create a medium which could hold significantly more data than a CD-ROM. You can store two layers of data on each side of a DVD. The first layer can hold 4.7 GB and the second layer 3.8 GB, which means that a single-sided DVD can store 8.5 GB of data. DVDs can only be read by DVD drives, which can also read CD-ROMs. Unfortunately many DVD drives are not able to read CD-Rs. Even fewer can read CD-RWs.

Currently the following types of DVD are available:

- DVD-Audio: A high capacity audio medium.
- DVD-R: DVD-Rs can store between 3.95, 4.7 and 9.4 GB of data. In order to store 9.4 GB, you must use the second side of the DVD-R which means that you have to turn it over.
- DVD-RAM: This is a rewritable medium which can store either 2.6 GB (one layer) or 5.2 GB (two layers) of data.
- DVD-ROM: This is the data medium.
- DVD-RW: This is a rewritable DVD which can be read by almost any standard DVD-ROM drive or DVD player. DVD-RW drives can also read and write to DVDs which are not rewritable. DVD-RWs have a storage capacity of 4.7 GB. The difference between these and DVD-RAMs is that they can also be played in standard DVD-ROM drives and standalone DVD players.
- DVD+RW: This is a rewritable DVD which can be read by almost any standard DVD-ROM drive or DVD player. DVD+RW drives can also read and write to DVDs which are not rewritable. DVD+RWs have a storage capacity of 4.7 GB. The difference between these and DVD-RAMs is that they can also be played in standard DVD-ROM drives and standalone DVD players.
- DVD-Video: DVD-Videos contain full-length feature films with high audio and video quality. The videos are encoded in MPEG-2 format.

Additional information:

- The UDF (Universal Disc Format) file system is used on DVDs. However the data can also be accessed via an ISO9660 data system which is also included on the DVD.
- DVD format no longer corresponds to any of the formats specified in the colored books.

## El Torito

El Torito is a specification which describes the structure of a CD used to boot a PC. A PC with a suitable BIOS can start the operating system from the CD and therefore does not need a floppy disk or a hard disk.

## Fast copying

This is a write process which does **not** involve storing the data to be written to the CD on the hard disk first. The data is written directly onto the blank CD. Another term used for fast copying is "on the fly".

## Finalizing

Finalizing is similar to fixing, but applies to the entire disc. No additional data can be written to a finalized disc. When you burn a CD or DVD in DAO mode, the disc is automatically finalized. However, the data on a finalized CD-RW can still be deleted (by choosing the Erase Rewritable item from the Recorder menu).

## Firmware

The firmware in recorders (CD/DVD-ROM drives) functions as the operating system of the drive and contains instructions which determine how the drive reacts to commands from the computer. The firmware of the latest recorders can generally be upgraded. For example, Nero AG's website contains a page with links to the latest firmware versions. To see the firmware version of your drive, use the 'Choose Recorder' item on the Recorder menu in **NeroLINUX**.

## Fixing

Fixing is similar to finalizing, but applies only to an individual session rather than to the whole CD. Fixing means closing the session which has just been written, so that it can be read. To do this, the lead-in and lead-out data are written to the disc. In the current version of **NeroLINUX**, sessions are always fixed automatically.

## Image file

This is a writing process which involves creating a physical image of a file. The contents of the image correspond exactly to the data which will be written to the CD.

## Grabbing

Grabbing is digital audio extraction that is reading audio tracks on a CD in digital format.

## Index positions

You can set index positions within an audio track. These index positions allow you to move to specific points within the track using an audio CD player. Unfortunately, very few audio CD players have the functionality which allows them to move to index positions.

Please note that index positions are not the same as the start and end of tracks. All audio CD players can move from one track to another on a CD, but very few can read and move to index positions within a track.

## Hybrid CDs

A hybrid CD contains files for more than one operating system. Generally, the term hybrid CD is used to refer to CDs which can be read by PCs running Windows and by Macs. If the data is to be accessible to both operating systems, there must be two copies of it on the CD.

## Lead-in

This is an area at the beginning of each session. However, it is only written to the CD when the session is completed. The lead-in contains the table of contents (TOC) of the session.

## Lead-out

This is an area at the end of each session which is written at the same time as the lead-in.

## m3u playlist

An m3u file contains a list of MP3 file paths. An m3u file can be created, for example, by **NeroMIX** or WinAmp.

## Mixed mode CDs

A mixed mode CD has one initial data track followed by audio tracks. This usually means that audio CD players cannot process the first track. If you are creating audio CDs to be played on a CD player, it is better to use the CD-Extra format, because on this type of CD the data follows the audio tracks.

## MP3 / mp3PRO

MP3 is an acronym (or file extension) for "MPEG Audio Layer 3". These are compressed audio files which can be played on a computer using an MP3 player. (MPEG stands for Motion Pictures Expert Group, which is a US standards organization responsible for full motion video standards.) MP3 was developed by the Fraunhofer Institute IIS and is restricted to audio data, in the same way as mp3PRO, which was developed by Coding Technologies.

The quality of the signal depends on the compression rate. The standard rates are 64 kbps at 44100 Hz stereo for mp3PRO and 128 kbps at 44100 Hz stereo for MP3. During the encoding process the original WAV file is generally reduced to about 5 percent of its original size in mp3PRO format and to about 10 percent in MP3 format. The encoding process is lossy, but the psychoacoustic models remove only those parts of the audio file which are considered to be inaudible. Audible parts of an audio file can only be lost at a high compression rate.

## mpg123

Due to some miscommunication between mpg123 and **NeroLINUX** it is currently not possible to convert single-channel MP3 files into audio tracks with **NeroLINUX**. mpg123 doesn't provide an option to force the creation of a raw stereo stream and there's no way **NeroLINUX** can get the information that a stream is either mono or stereo from mpg123. The file type registry will support one more field for determining the track format in future versions, though.

## Nero (Nero Claudius Caesar)

Nero was born in 37 A.D. and died in 68 A.D. He was Roman emperor from 54 to 68 A.D. He was the son of Agrippina, and was adopted by the Emperor Claudius. Seneca was appointed as Nero's tutor and Nero was brought up by his stepfather to be his heir. In 53 A.D. he married Octavia, Claudius' daughter. The first years of his reign were relatively calm, largely due to the influence of Seneca. Nero respected the Senate and the existing order. Poets hailed him as the initiator of a new golden age. Later he had his mother Agrippina murdered and banished his wife who had not provided him with an heir. He became increasingly tyrannical and rid himself of his more levelheaded advisers. He made eccentric public appearances as an artist and charioteer, he prosecuted citizens for treason and

after the great fire in Rome in 64 A.D. threw suspicion for having started it on the Christians. The suspicion that Nero himself started the fire cannot be proved, but it indicates what his citizens thought he was capable of. However, there was no real systematic persecution of Christians, since the events which took place were restricted to the city of Rome. After the failure of plot against Nero hatched in the Senate and lead by Piso, repression increased. Uprisings in Gaul, Spain and Africa caused the Praetorian Guard to withdraw its allegiance to Nero. The Guard then declared its support for Galba as emperor and the Senate declared Nero to be hostis populi Romani (an enemy of the Roman people), upon which he committed suicide. His death marked the end of the Julian-Claudian imperial dynasty.

## On the fly

This is a write process which does **not** involve storing the data to be written to the CD on the hard disk first. The data is written directly onto the blank CD. Another term used for on the fly is "fast copying".

## Packet CD / Packet writing

This is a write process which involves sending the data in blocks to the CD-RW drive without first creating an image file. The CD-RW drive is used in the same way as a hard disk or floppy disk, which means that any application can write the data to the CD. CDs created using packet writing can only be read with a special UDF driver.

## PCM

PCM is the main standard for digitizing audio files and speech. PCM stands for pulse code modulation and involves digitally encoding analog signals.

## Pre-gap

This is also referred to as a pause. It is the area on a CD which separates one track from another. In Nero the default pause is set to 2 seconds (Red Book standard).

## Session

CDs are divided into tracks and sessions. A session consists of all the files which are written to the CD in the course of one write process and can consist of one or more tracks. There can be more than one session on a multisession CD.

## Simulation

Simulation corresponds to the process of writing data, except that no data is written. Simulation is used to check whether the data can be sent to the recorder quickly enough to avoid a buffer underrun. It can also be used to check whether the recorder can actually write to the CD. You should use simulation when you are not sure whether the system can send the data quickly enough. If you have already burnt a few CDs successfully, you can switch off simulation. If your recorder has a buffer underrun protection function, you do not need to use simulation.

## Track

On an audio CD a track corresponds to a piece of music. On a data CD a track is a unit of data which joins consecutive sectors together.

## Track-at-Once

This is a method of writing data which is used for multisession CDs. The CD-RW drive writes all the tracks one after another and does not end the session until this is finished.

## UDF (Universal Disk Format)

This is a file system developed by OSTA (the Optical Storage Technology Association). With a UDF driver and packet writing, data can be written to a CD drive in the same way as to a hard disk or floppy disk drive.

## Volume descriptor

The volume descriptor is added to every CD track. It contains information such as the creation data, the publisher, the title etc. The volume descriptor has a special significance for formats such as Video CD, Photo CD and CD-i. The volume descriptor on these types of CD includes information about the program to be used for reading the data on the CD.

## Virtual Image

A virtual image is a project file which contains only references to the files which are to be written to CD.

## VQF

VQF or TwinVQ is a process developed by NTT Human Interface Laboratories to compress audio information. It has been developed in competition with MP3. Yamaha calls this process Sound VG. VQF files of similar quality are smaller than MP3 files but larger than mp3PRO files. More processor power is used in the decoding process than is the case with MP3 files.

## White Book

The White Book is a standard which is more commonly called Video CD.

## XSVCD (Extended Super Video CD)

XSVCD stands for Extended Super Video CD. The difference between this and SVCD is that the average bit rate can be anything up to 9.8 Mbit/s, whereas with SVCD it is 2.6 Mbit/s. Unfortunately not all drives which can read Super Video CDs support this format.

## XVCD (Extended Video CD)

XVCD stands for Extended Video CD. The difference between this and Video CD is that the bitrate can be anything up to 3.5 Mbit/s, whereas with VCD it is 1.5 Mbit/s. Unfortunately not all drives which can read Video CDs support this format.

## Yellow Book

The Yellow Book is the standard for the format of CDs used for data storage. As the data must not contain any errors, additional error correction data is included. This additional error recognition and correction data is included in Mode 1. In Mode 2 this information is not included and therefore this mode is only suitable for less error-prone data such as the video files on Video CDs.