Introduction

Linux users are often forced to keep a Linux/Windows dual-boot machine because their favourite application isn't yet available for Linux. This situation is constantly improving, and one of those applications which has now moved to Linux is the karaoke player. This article describes how you can get started with karaoke on Linux.

The Formats

The two song file formats used by the vast majority of computer karaoke players are KAR files and MP3+G files. There are others, but none of them are as popular as these two formats.

Though there are still many enthusiasts using the KAR format, it is generally considered inferior to its MP3+G cousin. KAR files are based on MIDI song files, and therefore use synthesised sounds rather than actual sampled music. The files are normally stored with a .mid or .kar extension, and contain both the music information and the lyric text. Due to their relative simplicity, KAR files take up very little space (approximately 50KB). There are a number of players for Linux which support the KAR format, such as KMid and Plarpebu.

The other main karaoke file format is MP3+G. It is based on the CD+G format used by many professional karaoke player machines, and offers more advanced audio and video than the KAR format. CD+G disks are audio CDs which have extra graphic data stored in the reserved subchannel area of the CD tracks. This allows for CD quality audio, together with some graphics used for displaying lyrics and simple images. The resolution of the graphics is 300x216 pixels with a choice of 4096 colours, though only 16 colours can be used at any one time. The graphics are not only used for displaying the lyrics. Some CD+G disks also display basic images, and implement simple effects such as colour cycling and scrolling text/graphics. An example of these graphics is shown in Figure 1 - Example CD+G/MP3+G Graphics, which is a screenshot of PyKaraoke playing an MP3+G file on Linux.
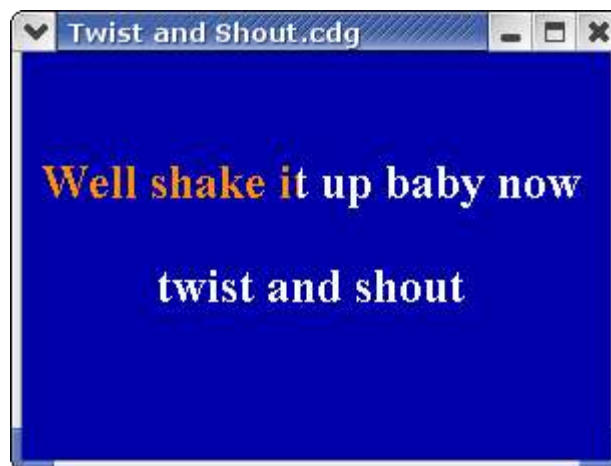

Figure 1 - Example CD+G/MP3+G Graphics

These CD+G disks can be ripped and stored on your hard disk in MP3+G format, for use with computer karaoke software. MP3+G consists of two files: the audio track compressed to a .mp3 file, and the graphic data stored in a .cdg file. Together these two files can be used by karaoke player software on your computer, as a replacement for a professional CD+G player machine. This offers more advanced graphics than is available with KAR files, as well as more advanced audio – MP3+G audio is a rip of the audio from the CD, and there is therefore no need to use synthesised sounds.

There are currently no Linux players that can play directly from CD+G disks, but there are three Linux players for MP3+G files: Plarpebu, cdg123 and PyKaraoke. In this article we will describe how to get a home karaoke system up and running using PyKaraoke.

Note that as well as these two standard karaoke file formats, some karaoke enthusiasts use movie formats for playing back karaoke on their computer. Karaoke disks are now available in DVD and VCD format, which can be played using any standard movie player such as mplayer or xine, or ripped to MPEG and played with the same programs. Because these are as easy to play back as any other movie, we will not describe how to play back those formats here.

The Story of PyKaraoke

Up until last year I was one of those people who rebooted back into Windows whenever I wanted to play some karaoke songs. I tried the cdg123 player, which was available for Linux, but at the time it was not able to keep the lyrics in sync with the audio, and only offered a small playback window. Frustrated with the lack of a decent MP3+G player for Linux I studied the CD+G specifications available on the net, and wrote my own player, PyKaraoke, using the Python language. This work evolved from a basic player started from the command-line into a full package with GUI features such as a playlist and song database.

I chose to implement the player in Python because, apart from it being a pleasant language to develop with, it offered good cross-platform abilities. The same PyKaraoke source code runs on Windows as well as Linux, and is expected to also work on other platforms such as OS-X, though to my knowledge no other platforms have yet been tested.

There is no built in support in Python for the kind of graphics and audio playback necessary for such a project, but there is an excellent library called Pygame which is available for most major platforms. Pygame offers mp3 playback and graphics facilities for Python programs, as well as MPEG movie playback.

Armed with the CD+G internal details documented in "CD+G Revealed", I wrote a module for decoding the CD+G packet details from .cdg files and displaying the results using Pygame. The decode process needs to parse the .cdg file, and translate the CD+G instructions into graphic commands such as "Set pixel 20,100 to blue". Together these graphic commands give all of the information needed to display the lyrics on screen using Pygame. At the same time as the graphic data is being painted, the mp3 file is being

played in the background, and care must be taken to ensure that the graphics currently being painted to screen are in sync with the current position in the MP3 file.

Early versions of the player supported most MP3+G files but it was not until more songs were available for testing that some of the more complicated graphical effects were tested. Later versions of the player implemented support for effects such as scrolling and colour cycling. These effects proved to be more CPU intensive than the simpler MP3+G graphics, and at times it looked like Python might not be able to provide the raw data processing speed needed for decoding and displaying the graphics. By utilising a fast array processing library, Numpy, however, I was able to optimise the player to support all of these effects without difficulty.

At the time of going to press PyKaraoke has reached version 0.2.1. All CD+G effects are now supported, and the player now includes a GUI frontend to make searching for and playing tracks easy. The story of Karaoke on Linux, however, does not end with MP3+G players.

Even at the beginning of 2005 there was still no Linux software available for ripping CD+G disks. To remedy this situation I wrote the cdgtools package, a collection of tools for handling CD+G disks under Linux. The main component of cdgtools is cdgrip, a tool for ripping CD+G disks and encoding the audio and graphics to MP3+G files. Together with PyKaraoke, this brings most of the needs of the karaoke enthusiast to Linux. Details on using cdgtools can be found later in this article.

Playing MP3+G Songs with PyKaraoke

PyKaraoke can be used to play MP3+G files and MPEG movie files. KAR file support is also expected to be included in a future release.

From the main GUI you can:

• Build up a searchable list of all of your MP3+G and MPEG karaoke files
• Perform a quick search through your collection using song title or artist
• Search and play MP3+G tracks from inside ZIP files
• Set up a playlist

The GUI features make the player ideal for karaoke parties, by making it easy to find songs quickly and set up a playlist.

PyKaraoke needs the following packages to be installed on your system:

• Python (http://www.python.org)
• Pygame (http://www.pygame.org)
• WxPython (http://www.wxpython.org)
• Numeric/Numpy (http://sourceforge.net/projects/numpy)

If these are not already installed, you can download them from the links above, or install

them using your distro's package manager. For example Gentoo users can install all packages using the following:

 # emerge python pygame wxGTK numeric

Once these packages are installed, you are ready to install PyKaraoke. Download the source ZIP file from http://www.kibosh.org/pykaraoke/ and unzip it to any location on your hard disk. There is no installation procedure required, you can simply run it from the folder you unzip it into using:

 # python pykaraoke.py

When the program starts, you will be presented with the Search View. From here you can search through the karaoke songs in your database. You must first set up your searchable song database, however, by clicking "Add Songs". This brings up the window shown in Figure 2 - Setting up the Song Database.
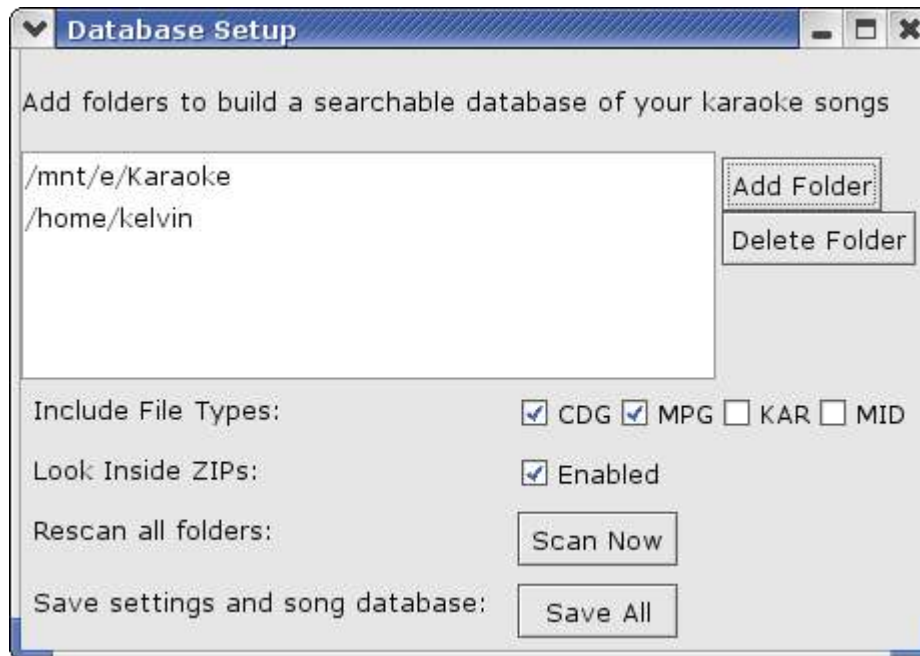

Figure 2 - Setting up the Song Database

You should add all of your folders which contain MP3+G files, and then click "Scan Now". This builds up an internal database of all of your songs, so that they can be quickly searched from the main GUI. You can also include ZIP files in the scan, in case you have any MP3+G files stored inside ZIPs. PyKaraoke will also index these, and you can play them directly from the ZIP file without manually unzipping them first.

Clicking "Save All" will save your database in your home directory (~/.pykaraoke directory) so that you do not need to rescan the folders every time you start the program. You only need to perform another scan if you have added more MP3+G files to your collection. Note that while KAR files are listed in the database window, the KAR format

is currently not supported by PyKaraoke – the format is listed there in preparation for when support is added.

Now that the song database is set up you can go back to the main window and use the song search engine (see Figure 3 - Main Search Window). After hitting the search button, any matches are listed in the left pane. You can play songs directly from there by double-clicking on the song title, or you can right-click and add them to your playlist. With the playlist feature you can add all of your songs in advance, and then double-click on the first song in the playlist (right pane) to start them playing. When each song is finished the playlist automatically moves on to the next song in the list.
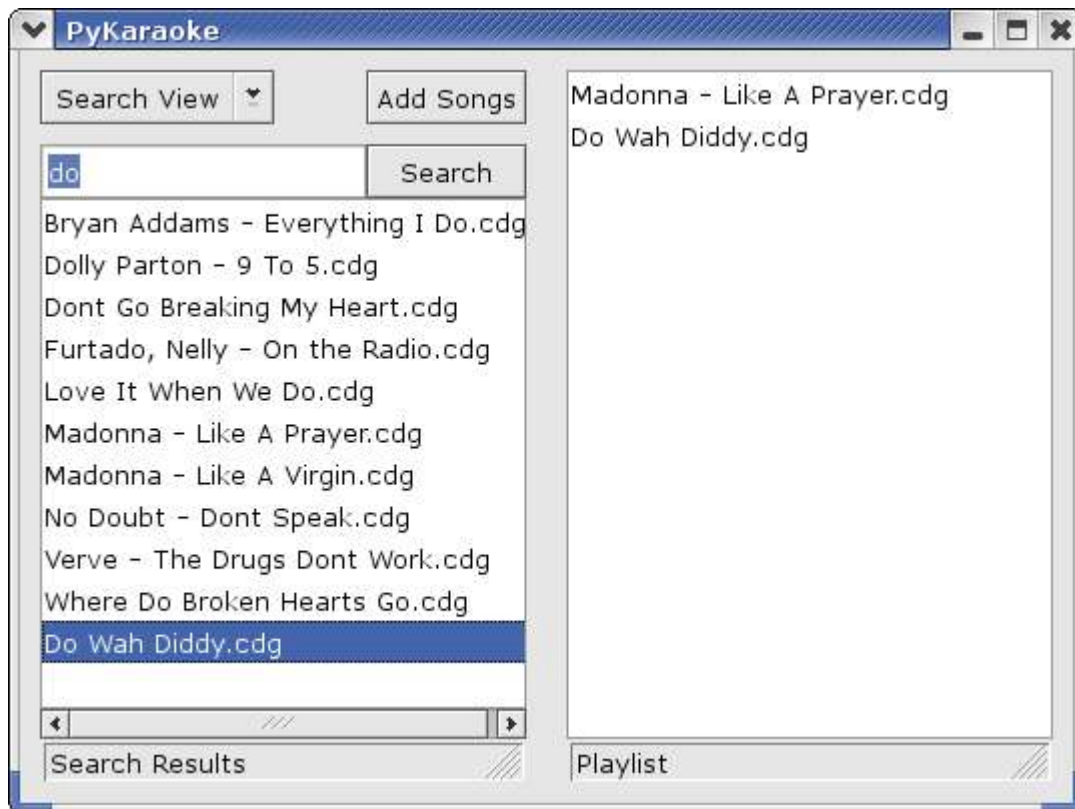

Figure 3 - Main Search Window

You can ignore the song database functionality if you wish, and browse the folders on your hard disk instead. Selecting "Folder View" in the main window brings up a list of your folders in the left pane. Using this you can look through your folders directly to find your tracks. As with the search results panel, you can double-click songs to play them or add them to your playlist by right-clicking. See Figure 4 - Folder View for an example.
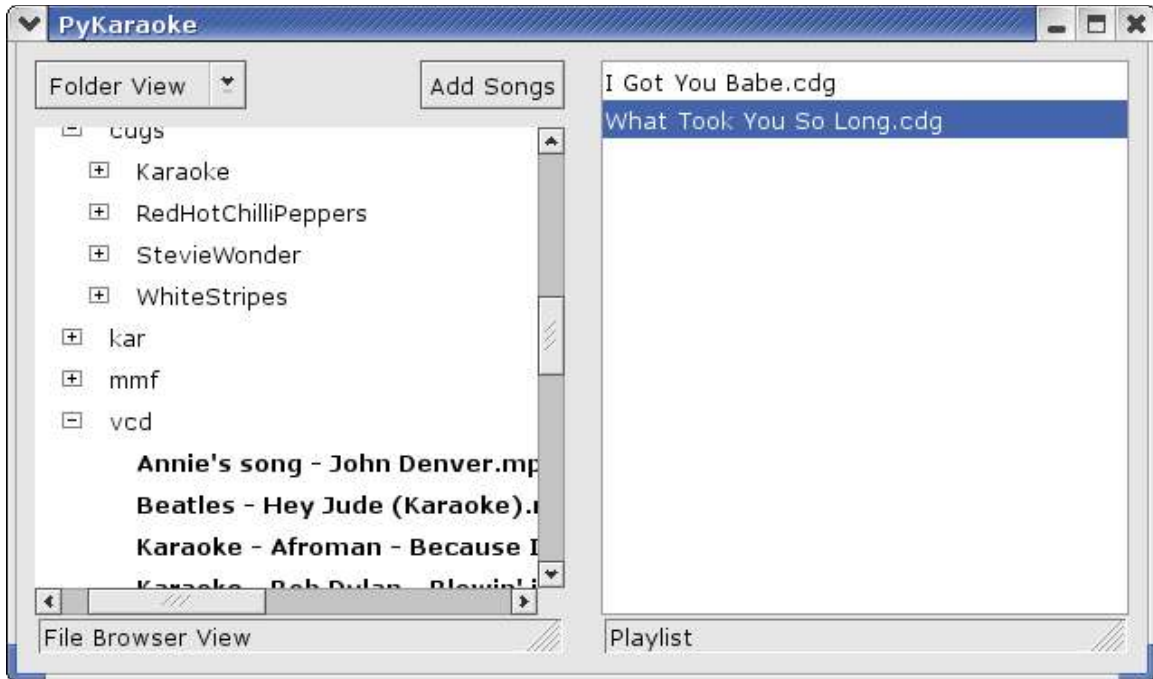
Figure 4 - Folder View

You should now be armed with enough information to run your own karaoke parties at home. For the full experience you could also connect a microphone to your PC, and set the video out to your TV if you have a TV out port.

Ripping CD+G Disks with Cdgtools

If you have a collection of CD+G disks you would like to play on Linux, you can do this by using cdgtools to rip the tracks to MP3+G files.

To use cdgtools, you must have a CD or DVD drive which supports reading CD+G disks. If you can't find CD+G mentioned in your drive specification, look for some mention of the ability to read the RW subchannel data. Cdgtools supports both the interleaved (raw) and deinterleaved modes for reading subchannel data from drives. The ripper performs a software-deinterleave so that it can support interleaved (raw) mode drives, a feature which is not actually available in all CD+G rippers available on Windows.

cdgtools needs the following packages to be installed on your system:

- Python (http://www.python.org)
- WxPython (http://www.wxpython.org)
- cdrdao (http://cdrdao.sourceforge.net)
- Lame (http://lame.sourceforge.net)

These are very common packages which should be available in your distro's package manager. For example to install all required packages on Gentoo use:

 # emerge python cdrdao lame wxpython

You can now download cdgtools from http://www.kibosh.org/cdgtools/. As with PyKaraoke, there is no installer for cdgtools. Simply unzip the source archive to any location on your hard disk, and you can run the program from there.

Cdgtools makes use of the cdrdao program to perform the actual ripping of the disk from your CD/DVD drive. You use cdrdao to generate a toc file and a bin file from the CD+G disk, and then pass these to cdgtools for converting to .mp3 and .cdg files.

To perform the initial cdrdao rip, use the following command line (replacing the *--device* option by the path to your CD or DVD device):

$ cdrdao read-cd --driver generic-mmc-raw --device /dev/cdroms/cdrom0 –read-subchan rw_raw mycd.toc

You may need to use a different *–driver* option, depending on which drive you are using. Consult the cdrdao manpage for details on which driver you should use for your drive. You may also need to use a different *–read-subchan* option, depending on which subchannel reading mode your drive supports. The *rw_raw* option tells cdrdao to use interleaved (raw) mode. If your drive only supports reading in deinterleaved mode, you can replace *"--read-subchan rw_raw"* with *"--read-subchan rw"*.

Once the cdrdao rip is complete, you should be left with a toc file (e.g. mycd.toc) and a bin file (data.bin by default). You can now use cdgtools to do the MP3+G encoding:

$ python cdggui.py

This loads the CD+G ripper GUI. From the main window you simply use the File menu to open the toc file generated by cdrdao (mycd.toc), and select "Encode to MP3+G" to encode the CD. This is all you need to do to rip the entire CD to MP3+G files.

If the CD is listed in FreeDB/CDDB, cdgtools will automatically use these song titles to name the .mp3 and .cdg files. Alternatively you can edit the track names in the tracklist window. See Figure 5 - Cdgtools GUI for a screenshot of cdgtools in action.

To encode individual tracks rather than the entire CD, you can also right-click on the chosen song in the track list and select "Encode track".

If you would like cdgtools to automatically delete the toc and bin files generated by cdrdao when it has finished encoding, you can enable this from the Options menu. Otherwise you will need to delete the toc/bin files yourself if you wish to free up the disk space used by these files.

cdgtools also comes with a command-line tool for performing the CD+G rips, which you can use instead of the cdggui program. After performing the cdrdao rip, you can use the command-line ripper as follows:

$ python cdgrip.py --with-cddb –delete-bin-toc mycd.toc

The *–with-cddb* and *–delete-bin-toc* are optional and can be ignored if you do not wish to consult FreeDB/CDDB or you do not want cdgtools to delete the toc/bin files when it is finished encoding.

Figure 5 - Cdgtools GUI

Obtaining MP3+G Songs

To build up your collection of karaoke tracks, you can either buy CD+G disks and rip them to MP3+G format, or you can buy or download them from the Internet.

If your CD/DVD player supports CD+G disks, you can use cdgtools under Linux to rip the tracks to MP3+G files. CD+G disks are available from many online retailers such as http://www.shopkaraoke.com, as well as from some high street shops. Once you have ripped the disks to MP3+G format, you can play the songs directly from your hard disk using PyKaraoke.

Alternatively there are some online retailers offering downloadable MP3+G files. See http://www.tricerasoft.com for a good example. From sites like this you can download the files already in MP3+G format and play them directly using PyKaraoke.

What's Left?

The two main karaoke features still missing on Linux are the ability to play CD+G disks directly, and a tool for creating your own MP3+G songs. Demand for these features is not great, however. You can still rip your CD+G disks using cdgtools and play the tracks as

MP3+Gs, which should be enough for most users. If you wish to create your own MP3+G songs, you must currently do this using a package like Karaoke Builder Studio on Windows. If you feel inclined to write a Linux package to do this, feel free to get in touch with me at kelvin@kibosh.org in case I can be of any help. You could also study the PyKaraoke source code, and consult the excellent "CD+G Revealed" document.

Useful Links

http://www.kibosh.org/pykaraoke/   PyKaraoke MP3+G player

http://www.kibosh.org/cdgtools/   Cdgtools CD+G ripper

http://developer.kde.org/~larrosa/kmid.html   KMid KAR player

http://sourceforge.net/projects/plarpebu   Plarpebu MP3+G & KAR player

http://jbum.com/cdg_revealed.html   CD+G Revealed

http://www.pygame.org   Pygame

Author

Kelvin Lawson (kelvin@kibosh.org)