Ardour Export Redesign

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1 Introduction

The basic purpose of Ardour's export functionality is to create mixdowns of multitrack arrangements. On the user interface side, this happens through a dialog.

I redesigned the layout of a few of Ardour's dialogs for the 2.0 release before, but here I saw some deeper issues and opportunities, calling for a much farther-reaching design process.

In many cases, exporting as it is currently implemented doesn't deliver the final result; additional steps and tools are needed. This is inefficient, and is more demanding on the user. Some functionality should be added, but a line needs to be drawn somewhere. For example, it's not feasible to turn Ardour into a CD / DVD authoring environment.

2 Insights From a Survey

I conducted a quick survey on the Linux Audio Users Mailing List to learn about the needs, wishes and problems of actual users. It's in the list's archive starting with
http://lalists.stanford.edu/lau/2007/02/0665.html.

2.1   Export When?

Exports are done not only at the end of a project, but also when creating snapshots of work in progress. This makes it even more important to streamline the process.

2.2   Channel Count

Besides the usual destinations (CD, DVD, Web), there are productions for concerts and theater, which demand flexible multichannel support. Typical channel counts:

– Stereo is the common case
– 6 channels for 5.1 surround
– any number for specific setups

2.3 Requested File Types

Primary: WAV and WAV64, FLAC, Ogg, MP3.
Secondary: AIFF, AAC.

WAV, WAV64 and AIFF are already supported. I would add WavPack as it's currently the only option for lossless compression of audio from and to Ardour's native sample format, 32 bit float.

Note that I failed to differentiate between container formats and encodings in my question and not one respondent objected. It seems to be very common to assume that an Ogg file contains Vorbis encoded audio, even though it might not, for example.

2.4 Sample Formats and Rates in Use

16 bit and 24 bit integer, 32 bit float.
44.1, 48, 96 kHz.

2.5 Wish List

2.5.1 More than one format at once

It's common to want at least one uncompressed and one compressed format. Exporting to several formats at once would be a time-saver as it cuts out navigational overhead.

Still some respondents deem it unnecessary and point to using command line tools like lame, oggenc and flac. I think the user should not have to touch the command line. The knowledge to use said tools cannot be expected of all users.

2.5.2 Files per Track / Bus

The ability to export tracks / busses to separate files. Only tracks have been mentioned explicitly, but there is no reason to exclude busses.

Archiving and exporting to other applications are the primary uses. Another very specific use would be to realize multichannel playback with several (stereo) devices.

Mapping tracks / busses to files is a different problem from mapping outputs to channels. So this should be taken care of separately.

2.5.3 Optionally store timestamps

Storing time offset from session start. Only a few specific formats allow this. Broadcast Wave Format (BWF) and AIFF support this by different means, plain WAV doesn't. For BWF either the bext or the iXML chunk could be used.

There's no offset when exporting the whole session, so this is only of interest when exporting ranges or when exporting tracks / busses to separate files without including leading silence.

If a format that supports this capability is chosen, offset could be stored by default. If there are no negative consequences to be expected, it doesn't need to be optional.

2.6   General Problems

JACK applications that do not support freewheeling (processing audio not in realtime, but as fast as possible).

– The export dialog could have an option to not use freewheeling.

– All JACK applications supporting freewheeling would be the optimal solution.

3   Feature Requests

Relevant feature requests on Ardour's tracker.

3.1   Multichannel

http://tracker.ardour.org/view.php?id=725

A request (with duplicates) for exporting to multichannel files, not just stereo files. This is a clear need to be addressed.

3.2   Individual Files

http://tracker.ardour.org/view.php?id=1581

Exporting tracks to separate files as in 2.5.2.

3.3   Realtime Export

http://tracker.ardour.org/view.php?id=1552
http://tracker.ardour.org/view.php?id=1052

Export in realtime instead of freewheeling mode to make use of outboard equipment or to just listen to the export. This can be done by recording the mix on a new track and exporting that, but realtime export has still to be considered as an option.

3.4   Range and File Export History

http://tracker.ardour.org/view.php?id=1398

Listing previous exports and using settings of a previous export. I see this as an indication of a need for presets or another way to recall settings.

3.5   Running a Script

http://tracker.ardour.org/view.php?id=1352

The ability to run a script on export. As longs as no examples outside of conversion, tagging and upload are brought forward, it is better to add such functionality to Ardour itself. This way all users can benefit.

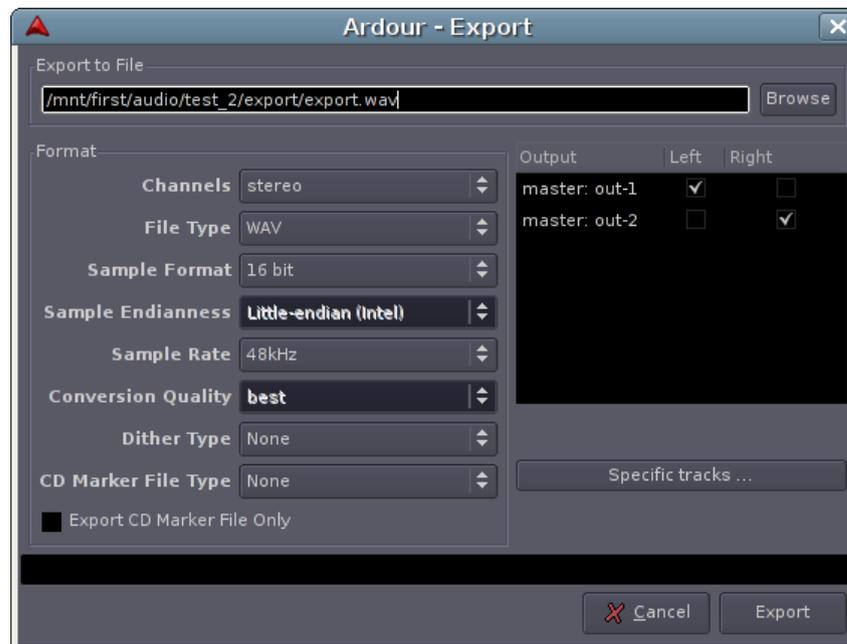### 3.6   Export Markers as Text

http://tracker.ardour.org/view.php?id=1142

I assume CD marker files can be used for this.

4 The Current Dialog

Issues and recommendations, based on Ardour 2.0.2.

The dialog as brought up for either exporting the session or selection. The version for ranges has an *"Export to Directory:"* label instead and lacks the *"Export CD Marker Files only"* option.

4.1 Time Span Selection

Pre-selection of session / range markers / range selection through a sub-menu is not optimal.

– The 3 options could be given in the dialog. Preselecting *Selection* if one exists and otherwise remembering the last choice should be more efficient than requiring the user to select from a sub-menu each time. CD marker export being tied to exporting the whole session would be more obvious.

4.2 Ranges

No way to export a subset of ranges, to verify the extents of ranges or to rename them (range names are used as filenames).

– List ranges for selection. Allow easy selection / deselection of all ranges. Make names editable.
– List start and end times of ranges. Allow display as Bars:Beats, Timecode or Minutes:Seconds.

4.3 File vs Directory Selection

Exporting the whole session requires a filename to be specified. Exporting ranges (range markers or selection) requires a directory because it will usually create several files.

But when exporting ranges, the *"Save As"* dialog with *"Export to file"* as window name implies that a filename has to be specified.

– The GTK File Chooser mode for selecting folders should be used with a proper window name (gtk.-FILE_CHOOSER_ACTION_SELECT_FOLDER).

4.4 Container Types

Container types are listed in random order.

– The more often used WAV, W64, AIFF should be listed above more obscure types (raw, PAF, AU, IRCAM).
– Alternatively: List types alphabetically.

4.5 Endianness

For several container types, Endianess can be chosen, even though most applications expect a specific Endianness per container type.

– To avoid incompatibility and user confusion, and to save space, do not offer this option.

4.6 Channel Count

Only mono and stereo are supported.

– Allow as many channels as anyone would use. If one doesn't export channels to separate files, container formats set an upper limit (libsndfile doesn't allow more than 256 channels for any container).
– Allow exporting to several mono files at once.
– Assuming that a user would rather ask "*which container / encoding can I use if I need this many channels*" than "*how many channels can I have with this container / encoding*", channel count should act as filter on container and encodings offered, not the other way around.

4.7   Mapping Channels

Doing the common thing of mapping the channels of a stereo bus to the left and right channels of the export involves clicking 2 checkboxes.

– Consider using bus / Track selection, while having per channel mapping as a second and optional stage.

Only master outputs are listed initially. Clicking the *"Specific Tracks ..."* buttons reveals all other tracks and busses.

– List master outputs first, followed by all busses, and finally tracks. Busses are more likely to be used as sources. An option to show or hide parts of the list only takes up space than can be better used to show one item more, as the list must be scrollable, anyway.

4.8   CD Marker Files

It's quite likely that a user wants to export the whole session with or without a CD marker file, or the marker file alone after moving range marks without changing anything else. The *"Export CD Marker File only"* option makes most of the export dialog useless when enabled. It's presented like a detail of low importance, while in fact it has a wide scope. The logic behind it is indirect.

 Marker file export is not available when exporting ranges, as ranges are used for track marks. With selection among ranges it could be an option.

– Include *"Export CD Marker File"* in the session menu.
– Have a positive option for exporting a marker file in the dialog.
– Offer marker file export with ranges selected as time spans.
– Visualize which ranges are used as CD marks.

4.9 Trimming

Reverb and delay tails make it necessary to leave some space at the end of a session. Trimming silence afterwards requires the use of external tools.

– Add a Trim Silence function. Make treatment of start and end separate options, as leading silence might be important for synchronisation. Allow setting durations of silence that will be left in or inserted as needed for controlled gaps.

4.10 Filename Conflicts

The presence of older exports with identical names triggers an *"File already exists. Do you want to overwrite it?"* dialog on hitting *Export*. While this is an improvement over silently overwriting, the dialog is an annoying extra step. Users tend to form a habit of clicking away such dialogs without reading.

Old files could be moved out of the way, but exported files shouldn't be touched by Ardour again, as it would be rather surprising behaviour. Automatically attaching a number might frustrate the user.

There has been a suggestion to allow listing prior exports with their options. This would require a log regarding files that are not under Ardour's control and can reside anywhere on the system. It can be taken as an indication of a need for more informative filenames, though.

– Show a warning in advance, within the dialog, that files will be overwritten. Offer to append a number (counter) to ensure that the filenames are unique.
– Encourage the use of date and time in filenames.

4.11 Peaks

To detect peaks above 0 <u>dBFS</u>, the user has to keep an eye on the editor or mixer window. Afterwards it can be hard to find the location where a peak occurred. Note that peaks above 0 <u>dBFS</u> will result in clipping in integer, but not in floating point encodings.

– Indicate peaks above 0 <u>dBFS</u> in the dialog. List locations of occurrences during export. (Side note: tracks / busses should have peak logs and some means to navigate to the listed locations.)
– Offer normalization as an optional step prior to encoding.

4.12   Blocking JACK

This is actually an infrastructure problem: During export, the JACK server goes into freewheeling mode and can not be used to listen to audio. For large sessions, this might become a problem. There are no ideas or plans to tackle this problem on the JACK side.

– Add an option for internal mix-down, bypassing JACK. Attached JACK clients can't be mixed-in then, but the server remains available.
– Allow exporting to be done as batch job.

4.13   Does it have to be a dialog?

Tracks / busses could take files as output destinations. Freewheeling could be a transport option.

Setup wouldn't be any simpler. The need to enable or disable recording to files and freewheeling would make this approach more complicated to use.

If the layout can be kept rather narrow, it might fit on an export tab on the notebook to avoid having a dialog obstructing the view on the arrangement. That might lead to wrong expectations of full interactivity, though.

5 Track Export

Exporting tracks to files leads to partly different requirements and is thus better handled separately. But if there will be an *"Export Tracks"* in the menu, *"Export"* should perhaps be changed to *"Export Mixdown"*.

Just a few notes / wish list items.

– Export pre-fader, with or without plugins
– Store time offsets
– Trim or include leading silence
– Track / bus selection
– Time span selection
– Joint or split stereo / multichannel
– A switch to disable all panners

6 MIDI

The upcoming MIDI sequencing and editing support raises the question of how to deal with it regarding export.

Only the source selection part of exporting makes sense for MIDI. In this way, it's similar to CD TOC / CUE files. There could be a single option to export MIDI alongside audio, but this wouldn't cover the case where one wants to export only MIDI well. So I think there should be a separate export item in the menu.

MIDI is stored in SMF files. MIDI regions map to this files just like audio regions map to audio files. Because of this just copying the files isn't enough for exporting, the referenced parts need to be combined.

7 Steps After Exporting

Common or simply useful steps taken after exporting with the current limitations. Each one should be evaluated as candidate for inclusion of analogous functionality in Ardour.

7.1   Normalize

If the mix doesn't reach 0 dBFS by careful leveling, use of automation and compression, the user might want to normalize.

If there are peaks above 0 dBFS, normalization prior to leaving the floating point format is obviously better than clipping. Hence normalization should be an option to be applied prior to sample format conversion.

It has been reported that the Ogg Vorbis codec has problems with 0 dBFS peaks. While I can't confirm this, there might be other cases where the level has to be kept below 0 dBFS, so a normalize option should have a target value parameter.

7.2 Trim silence

Tails of effects like reverb and delay will often result in dead space left at the end of a session, because the end mark can't . Trimming silence saves space and allows gap-less playback. In some cases, it might be desirable to have a specific duration of leading or trailing silence.

This is a must if export is meant to create a finished product. Especially if encoding with compression is to follow, as compressed files can't easily be cut without re-encoding.

7.3 Encode

Encoding using lossless or lossy compression formats for archiving, mobile players or online use.

Currently one either has to use sound editors, which take time to load, or command line tools which are not an option for the uninitiated. So there's quite a lot to be gained in this area regarding efficiency and user friendliness.

7.4 Tag

Adding metadata like artist name or licensing information. Dealing with tagging in Ardour would be of advantage where one session is exported to several formats. It's also an opportunity to encourage proper tagging, including specifying a license.

7.5 Upload

Transfer to a personal website or places like archive.org or ccmixter.org.

Direct uploads to remote hosts via standard protocols is a job for the underlying infrastructure.

Specialised upload tools could be started up automatically and given paths and meta-information as arguments if they support it. However, support of any single upload tool would be too specific to justify the development effort.

7.6 Burn CD / DVD

Burning an audio CD or DVD-A. For CDs, almost all information is inside Ardour already, so on the interaction level only hardware related options are missing. However, the need for such options and the CD as target dictating the format make it advisable to use a specialised dialog. A CD image could be offered as container in the normal dialog, but there would be the problem of it depending on / having to

set several options.

All I can find regarding DVD-A support on Linux is http://dvd-audio.sourceforge.net/status.shtml, which rather suggests it's incomplete and abandoned. So Ardour should make it easy to export suitable raw material but has to stop there.

7.7 Backup / Archiving

Storing on another partition, hard drive or removable media. General file management is not a task for Ardour.

However, archiving is another reason for exporting tracks to separate files, as it lessens or removes the dependency on Ardour (or a specific version of Ardour in case the session format changes).

7.8 Authoring

Using the exported audio in combination with other media. The only concern for Ardour here is compatibility, as extending Ardour to become an authoring environment is not feasible.

8 Container Formats

Ardour uses libsndfile, so it should be straightforward to add formats that it supports but Ardour currently doesn't. For other formats, it has to be considered to add them to libsndfile or to use other libraries alongside.

Everything relating to libsndfile is based on version 1.0.17. See http://www.mega-nerd.com/libsndfile/ for more information.

A lot of time could be spend on researching and documenting container formats and encodings. I will focus on collecting just enough information for the design of the export dialog.

Comparison of container formats on Wikipedia.

8.1 libsndfile, currently offered for Export

These can and should be used with linear encoding exclusively.

– AIFF (Apple / SGI)
– AU / SND (Sun/NeXT)
– IRCAM / SF (Berkeley / IRCAM / CARL)

– PAF / FAP (Ensoniq PARIS)
– RAW / GSM / VOX (header-less)
– WAV (Microsoft)
– W64 (SoundFoundry WAVE 64, WAV with 64 bit header for longer recording times)

8.2   libsndfile, also interesting

CAF (Apple Core Audio File)

8.3   libsndfile, rather exotic

These shouldn't be supported unless requested by several users.

– SVX / IFF (Amiga IFF / SVX8 / SV16)
– VOC (Creative Labs)
– MAT4 (GNU Octave 2.0 / Matlab 4.2)
– MAT5 (GNU Octave 2.1 / Matlab 5.0)
– MAT4 (GNU Octave 2.0 / Matlab 4.2)
– PVF (Portable Voice Format)
– SDS (Midi Sample Dump Standard)
– SD2 (Sound Designer II)
– WAV (NIST Sphere) National Institute of Standards and Technology
– XI (FastTracker 2)

8.4   Interesting

– BWF – Broadcast Wave Format
– Matroska
– MBWF / RF64
– Ogg

8.5   Problematic

Problematic due to patent and / or licensing issues.

– ASF / WMA. Advanced Systems Format / Windows Media Audio. WMA files use ASF containers

8.6   Not of further interest

Audio / Video container formats that are not commonly used for audio only. As long as Ardour doesn't even import video, exporting it is out of question. Patent and licensing issues may also apply.

– 3GP – 3G mobile phones
– AVI – Audio Video Interleave
– DMF – DivX Media Format
– FLV – Flash Video
– MCF – Multimedia Container Format
– MPEG (1, 2, 4)
– NUT
– Ogg Media

– Quicktime
– RealMedia
– VOB – DVD-Video Object

9 Encodings

FLAC, MP3 and WavPack have their own container formats, but can be wrapped in Matroska.

See also: List of codecs on Wikipedia.

9.1 Libsndfile supported
– Linear (integer, float)

9.2 Interesting
– FLAC – Free Lossless Audio Codec
– Ogg Vorbis
– WavPack

9.3 Problematic
Problematic due to patent and / or licensing issues.
– AAC
– Apple Losless. There's a reverse engineered open-souce codec, but any of the truly open losless co-decs is a better choice by avoiding possible legal issues.
– Dolby Digital AC-3

– <u>LPAC</u>
– <u>Monkey's Audio</u>
– <u>MPEG-Layer-3 (MP3)</u>. <u>LAME</u> could be used, though.

9.4   Not of further interest

– <u>iLBC</u>. License free, aimed at VoIP.
– <u>Musepack</u>. Open source, but doesn't seem to be well established or offer compelling, unique features.
– <u>Ogg Speex</u>. Open source, aimed at speech.
– <u>OptimFROG</u>. No code or specification available.
– <u>Shorten</u>. Unclear license, doesn't compare well to newer lossless codecs.
– <u>TTA</u>. Evaluation like Musepack.

10 Tagging

Several container formats have their own tagging standard. The best known is <u>ID3</u> as used with MP3.

<u>APEv2</u> is used by Musepack, Monkey's Audio, OptimFROG and WavPack. <u>Vorbis comment</u> is used by FLAC, Speex and Vorbis.

WAV allows no tagging at all. BWF is an extension of WAV to add metadata. <u>iXML</u> is designed for file and project based metadata and can be embedded in BWF.

The need to store a specific piece of metadata can be a constraint on the choice of a container. Ardour should store user and session related metadata and assist the user in tagging exports. This should include Creative Commons licensing, but also plain copyright notices.

11 Marker Files

Ardour currently supports <u>CUE</u> and TOC as CD marker files. Together with an exported audio file of the right format, both can be used to burn a CD with proper track and index marks. TOC is the most basic. CUE adds support for CD-Text.

There are 2 formats to store disc images with metadata: <u>DDP</u> and <u>CMF</u>. DDP can be used for CD, DVD, HD DVD-ROM and Blu-ray. <u>DCA</u> offers DDP licenses free of charge, but hasn't answered to requests from Nick Mainsbridge. CMF is a derivative targeted at DVD.

12 Elements

Elements that are involved in exporting. This serves as a checklist to make sure all aspects are covered.

12.1   Input
– Session
– Tracks
– Busses
– Outputs
– Routing
– Range marks (CD tracks)
– Location marks (CD Indexes)

12.2   Output
– Path
– Filename(s)
– Container Format(s)
– Encoding(s)
– Channels
– TOC / CUE
– Tags / Metadata

13 Requirements

13.1 Core

The central purpose of the export functionality is to render any aspect of a session to a file as fast as possible (or in realtime).

An aspect of a session is constituted by a selection along the time axis and a selection of track / bus outputs.

"As fast as possible" leads to the use of the JACK freewheeling mode.

Thus there need to be means of:
– Specifying the source(s)
  • Selecting one or more time ranges (session start to end marks, range marks, currently active range selection)
  • Selecting one or more outputs
– Mapping source(s) to target(s)
  • Specifying the channel count of file(s) to be created
  • Map outputs to the channels of file(s) to be created

– Further define targets:
  • Encoding and specific options
  • Conversion options (if resampling or sample format conversion is required)
  • Container type and specific options
  • Filename and path
– Selection of realtime or freewheeling mode and triggering the export process
– Cancelling

13.2 Layout

The layout should reflect the hierarchy and process flow. Follow the GNOME HIG.

The dialog should fit within a 1024 x 768 screen resolution. After subtracting 75 pixels for 2 panels and a titlebar, 693 pixels are left for the height.

13.3 Presets

– Default to settings suitable for CD production.
– Remember settings used last time.
– Allow loading and saving of all dialog-specific settings as presets.
– Allow presets to be renamed and removed.

The same settings are likely to be reused. There might be reoccurring scenarios, hence a need for presets.

13.4   Speed

– Offer a realtime mode, but present freewheeling as default.

13.5   Time span

– Offer session, ranges, selection in the dialog, not in a submenu.
– Preselect S*election* (ignoring the last used option) if one exists; otherwise disable it.
– List ranges for selection with start and end times (modes: Bars:Beats, Timecode, Minutes:Seconds) and editable names.
– Mark ranges that are used as CD track marks.

13.6   CD Marker Files

– Offer CD marker file export as an option, regardless of time span selection.
– Offer CUE and TOC as options.
– Place inside the time span area.

– Include *"Export CD Marker File"* in the session menu.

13.7   Mapping

– Have a means to specify channel count.
– Allow mapping of all outputs of an item to matching target channels at once. For this there should be a single representation of each bus / track.
– Default to mapping master outputs to Left and Right if applicable.
– Make it easy to swap channels.
– List the master bus first, followed by all other busses, and finally tracks.
– Offer a *"Split to mono files"* option.
– Consider having a means to reverse the order of the mapping.

13.8   Processing

– Offer normalization. Allow to set a target below 0 dBFS.
– Offer Trim Silence separately for start and end with an adjustable duration to leave in / add.

13.9   Container and Encoding

– The number of channels required should be a constraint on the available container formats.
– Bundle all container and encoding options in loadable / savable profiles. Ship with preset profiles for typical cases. Attach labels like *"Audio CD"* to make clear what each preset profile is about.
– Rate and bit depth parameters for linear encoding need options to keep the session's native format (no resampling or conversion).
– Allow setting or narrowing down container, encoding, and options by choosing a destination and / or by specifying high level requirements.

We can not count on the user being familiar with technical details of containers and encodings. But every user is likely to have a destination and / or high level requirements in mind.

13.10   Target Folder

– Default to one level above the session folder.
– Default to within the session folder if an equivalent path was used last time.

It might not be a good idea to encourage exporting to within a session folder, as it can be treated like an opaque entity otherwise. But if the user chose to do it last time, it's a good guess they will do it again.

Separate target folders per format would mean having many controls and no direct way to change the path for everything. Also, it's not clear if it should be bound to encoding, sampling rate or any other option.

13.11   Filenames

– Show a warning in advance, within the dialog, if files will be overwritten

Assist the user in adding any of the following to filenames:
– Session name
– A free label
– Date (filesystem time-stamps are not robust and don't help to avoid name clashes)
– A revision number

Some of the following will have to be added automatically if multiple files will be exported:
– Range Names
– Bus / Track names

– Encoding
– Encoding options

Giving the user complete control about every aspect of naming would be too complicated.

13.12   Multiplication
Allowing to export to several formats with varying settings at once could be generalized to also allow multiple instances of other sections (sources, channel mapping, file naming and paths).

This might be expensive to implement, so there should be proposals with and without it.

13.13   To be left out
Things left out for now, which can be addressed in a later iteration:
– Batch mode
– Internal mixdown option, bypassing JACK
– Metadata. This needs a strategy reaching beyond the export dialog.
– CD-Text

14   Design

The mockups are based on Ardour's current dark theme. All images are linked for easy 1:1 and independent viewing.

14.1   Presets
How to offer saving, loading, renaming and removal of presets in the most simple way?

File handling would be overkill; the presets are better stored in one location the user doesn't need to manage.

A drop-down list is well suited for preset selection without taking much space. Turning it into a drop-down list entry allows renaming the current preset without any button or popup. If settings have been changed, a *Save* button right next to the entry can be enabled. It will cause the settings to be saved under the currently entered name. Only one more button is required: *Remove.*

With a plain drop-down list, *Save* would have to bring up an entry for the name and an additional *Rename* button would be advisable.

14.2 Multiplication

If each section (Time Span, Channels, Format, File) can be instanced, there need to be means of adding and removing instances. Showing all instances (for all sections) at once would take too much space.

The most simple interpretation of section instances would be to go through all combinations. However, this would not allow to save different formats to different places.

A routing model is more useful. Initially there would be one route through each section, all having a single instance. Adding an instance forks the route, but less instances in the next section will join routes. This can be represented with a table.

There's one selected instance in each row. The corresponding parameter sections will be shown below the table. Clicking an unselected instance selects it and also changes the selection in the other rows if required for showing one complete route.

Alternatively, only one instance could be selectable with only one parameter section shown to keep the dialog smaller. But this would require more clicking and be problematic in layout, because the sections vary a lot in size requirements, as we will see.

With this simple table version, adding and removing instances (and optionally disabling) has to happen via context menu. The name should be editable right after adding and later on via context menu or double-clicking.

Making it all directly accessible:

If there's more than one instance in a row, x symbols appear for removing. Instances can be added by clicking the + areas on the right.

Note that here instances are always added on the right, whereas with the simple table, the instance context-clicked on is split in halves.

The "List Markers" button is optional and meant to bring up a dialog for checking track and index markers.

14.3 Time Span
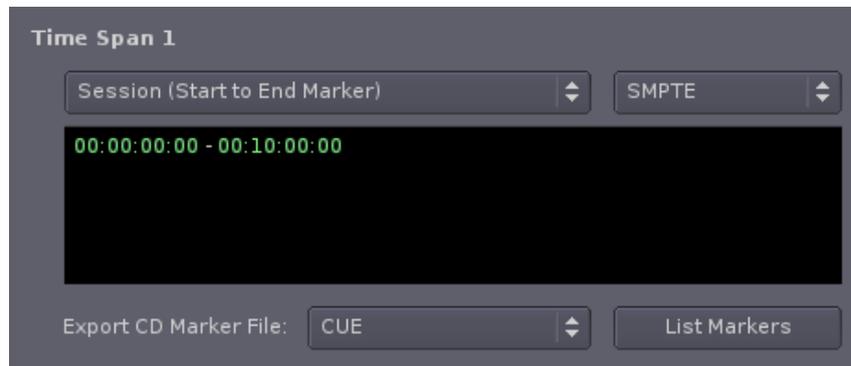
The options for the first drop-down list are: *Session (Start to end Marker)*, *Ranges*, *Selection*. Without the hint, *Session* could be mistaken to mean the complete arrangement or scrollable area.
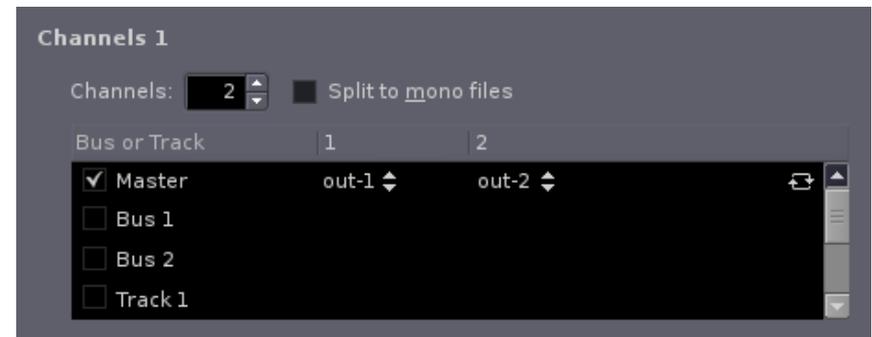
Second drop-down list options: *Bars:Beats*, *SMPTE*, *Minutes:Seconds*.

The list box presents start and end times for either the session, selection or ranges. Ranges are listed with editable name and a checkbox in front. *"Export CD Marker File"* options: *None*, *CUE*, *TOC*.

14.4 Channels

Master is listed before busses, before tracks. Outputs are only listed for selected busses / tracks. The output items work like drop-down lists. The icon on the right is for reversing the mapping.

14.5   Format

Format 1

Audio CD: normalize, trim, linear, 16 bit, 44.1 kHz, WAV ⬍   Edit Profile
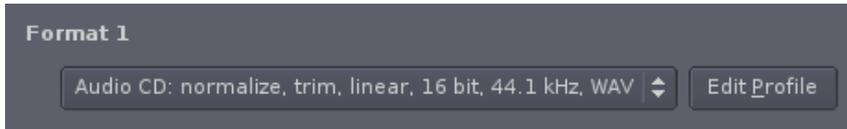
Detailed format settings take too much space to also fit into the dialog. A good selection of profiles (shipped by default, tweaked and completed by the user) should make access to the details unnecessary in most cases.

The dialog to be brought up via *"Edit Profile"* on the right: the label field is meant to take a short name; the parameter list for the drop-down list on the main dialog is filled in automatically.

The *"Trim"* and *"Add silence"* options could be combined into a single pair. A value of zero would be plain trimming. But I couldn't think of a good label for the combined functionality; presenting it as separate steps should make it easier to understand (thanks to Ben Loftis for suggesting this).

Label: Audio CD   New   Remove

☑ Normalize to: 0.0 ⬍ dBFs

☑ Trim silence at start   ☑ Add silence at start: 00:00:00:00

☑ Trim silence at end   ☑ Add silence at end: 00:00:00:00

Compatibility	Quality	Encoding	Container
☑ Audio CD	Free	FLAC	AIFF
☐ Cubase	Losless	Linear	AU
☐ DVD-A	Losless compression	MP3	BWF
☐ Free Software (GPL)	Lossy compression	Vorbis	CAF
☐ iPod		WavPack	FLAC
☐ Pro Tools			IRCAM
☐ Windows Mediaplayer			MP3
			Matroska
			Ogg
			PAF
			W64
			WAV
			WavPack

Linear Encoding Options

Sample Format: 16 bit ⬍   Conversion Quality: Best ⬍

Sample Rate: 44.1kHz ⬍   Dithering: Shaped Noise ⬍

Revert   Close

The *Compatibility* list allows multiple selections, unlike the other lists. Check boxes are used to make this difference clear. Items in the *Quality*, *Encoding* and *Container* lists that are in conflict with selected items are shown in red, but are not disabled. Selecting a red item clears conflicting selections. The goal is to put knowledge into the user interface and to allow fast selection.

Matroska can contain FLAC, MP3, Vorbis, among others. Ogg and Vorbis are usually combined and I don't see much need to put other encodings into Ogg. Without Matroska and with Ogg Vorbis combined, the table could look like this:

Parameters for the selected encoding appear below the table. Container options, including tagging, would follow.

14.6   File

For maximal flexibility, the naming parts would have to be reorderable. This would be quite complicated in interaction and implementation, so I propose a fixed layout instead. Date and time are represented by the current date and time and can have a number of formatting variations. The *"off"* items are *"No Date"* and *"No Time"*. I omitted labels to save space on the already large dialog.

The *Folder* entry should act like the *Location* entry in the GTK+ open file dialog.

14.7 Action
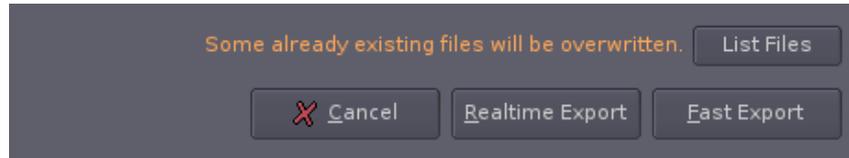
If already existing files will be overwritten de to fi-
lename clashes, a warning and a button for listing
the files appear. The export buttons colour could be
changed, additionally. Otherwise the areas stays
empty until it takes a progress bar on exporting.

Instead of having a mode switch and making the
user check its state, realtime or freewheeling export
are triggered by dedicated buttons (thanks to
Sampo Savolainen for this suggestion, made before I
had a chance of thinking of it).

14.8 All together

The parts assembled sadly take too much height
(836 pixels). Another layout is buiser, but fits into
640 x 712 pixels.

14.9 Simple

A version without any instancing:

Instancing for the format section only:

Tabs instead:

With adding rows, the dialog would have to grow or the list needs a scrollbar. Always the last row has a plus button for adding a row, all other rows have a minus button for removal.

Close buttons only appear if there's more than one tab.

15 Next

Some feedback from the community would be nice. Choices need to be made where I presented alternatives. The more ambitious aspects of the proposed design need to be evaluated for feasibility.

With a positive result, the next step could be working out a roadmap to get from the current dialog to a new one.

16 Credits

Thanks to: Paul Davis, Erik de Castro Lopo and Nick Mainsbridge for answering technical questions. All participants in the survey. Don Fredricks for proofreading an earlier draft and several good suggestions. Thomas Ilnseher for spotting an *Ogg* in place of a *Vorbis*.