



AVLinux MX Edition (AVL-MXE)

User Manual

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DISCLAIMER (PLEASE READ) :

Debian/GNU Linux comes with no guarantees so consequentially neither does AVL-MXE. I accept no responsibility for any hardware/software malfunctions or data loss resulting from its use. It is important to note that the AVL-MXE ISO may contain software that is non-free and may be distributed under special licensing arrangements with the original developers, re-distributing the AVL-MXE ISO with the non-free content included is a violation of these licenses. AVL-MXE may potentially contain Multimedia Codecs that may be under patent in certain countries, it is the Users responsibility to know the law as it applies to their own respective countries before downloading or installing AVL-MXE.

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About This Manual

This is a new User Manual for a new project, it is currently a Work-In-Progress and will be for some time I'm sure. AV Linux had a 130 page Manual and this new version is adapting as much relevant material from the former Manual as possible from there I will be adding new material as need arises and as I get better acquainted with MX Linux. In its current state most of the information has been screened for accuracy but there are many screenshots that are yet to be updated and will be in future Manual updates. A huge amount of time and effort goes in Documentation for any project and it is not in any way... 'fun'. This is why many Open-Source projects do not provide adequate (or any) Docs. Creating, sharing and maintaining AV Linux are all done 100% in my spare time.. I do this because I love to do it and because I want to do it... I don't need Kudos but I do need understanding that I can only provide so much in the time available. Getting as far as Documentation is stretching the envelope even further so I can make no promises of sustained availability for support, this is why AV Linux (now AVL-MXE) has no User Forum or specific daily help resources.. "Well isn't that great!! How do I get some help around here!!??" you may well ask..

Getting Help

Even though AVL-MXE doesn't have a full time dedicated User Forum there are plenty of ways to help yourself.. Number one is what you're reading right now! On top of that MX Linux is one of the best documented Linux projects I've ever seen and both its FAQ and User Manual are sitting right on the Desktop along with this User Manual. As clarified in the following section MX Linux is the 'wheels and chassis' of AVL-MXE and it has both terrific Docs and a large community on its even more terrific User Forum. AVL-MXE is new project and is still 'arms-length' from MX Linux so it is advised if you are a User Forum type of person for now post questions in the '**Respin**' section of the MX Forum. Make sure to mention 'AVL-MXE' in your question so people reading know what you are using. I also frequent the Linux Musicians Forum as much as I can and you can post questions pertaining to AVL-MXE there in the **Linux Distributions & Other Software** Forum section as well.

On the flipside of 'Getting Help' is receiving help and the number one need for AVL-MXE is for people already using it to assist others in using it! It's great to get some praise, awesome to get some positive press, and I always appreciate donations but **I need help the most** in supporting and assisting users of AVL-MXE! If you are finding AVL-MXE to your liking and getting things done with it and are an experienced Linux Content Creator PLEASE consider helping me to provide User support for AVL-MXE if you can spare some time and effort.

A New Chapter for AV Linux!

Since 2008 AV Linux has been an independently developed Debian-based OS to facilitate Multimedia Content Creation on the Linux platform. AV Linux has relied on 3rd-party ISO creation tools and Installers starting with 'Remastersys' and in recent years 'Systemback' and although these were both excellent Utilities they have both unfortunately ceased active development and in Systemback's defense it was intended as a backup application not really a Distribution tool. In recent years AV Linux has struggled with getting an increasingly popular production system that has matured over many years to install reliably on newer computers with UEFI booting firmware and NVMe SSD.2 drives and it was high time for a change.... Enter MX Linux!

My first experience with Linux was in 2006 with 'Mepis Linux' and it was a great introduction to the Desktop Linux world and now many years later after the Mepis project waned and evolved into MX Linux it remains a great Linux Distribution backed and supported by a large and enthusiastic community of developers and users and bolstered with a custom 'MX' toolset that is without peer. Among these tools are great utilities to Snapshot and create ISO Images and a modern simple-to-use Installer; both of which are what AV Linux was in dire need of.

After several months of development work here is an initial proof-of-concept new hybrid with a new name "AV Linux MX Edition" (a.k.a AVL-MXE)... Make no mistake the wheels and chassis are MX Linux and the kernel, customizations and Multimedia focus are AV Linux. Both MX and AVL are established projects recognized by the Linux Community and the naming scheme is to keep the AV Linux branding present and of course pay all due respect to the vital importance of MX Linux as the base Distribution. *It should also be made abundantly clear at this point AV Linux MX Edition is an independent and unsupported 'respin' of MX Linux and is not under any official umbrella of the MX and antiX projects.* It is my sincere hope that as time goes on both projects will blend together and share as many resources as possible but for now there is much work to be done and sufficient time needs to pass to assess what the potential is for a closer partnership.

AV Linux MX Edition is much more than MX with different theming and wallpaper, both projects have the XFCE4 Desktop Environment in common and both projects enjoy all the benefits of being based on Debian/GNU Linux. At first glance AVL-MXE looks like many other XFCE4-based 'Desktop Linux' Distributions and indeed can easily be used a 'daily driver' for basic everyday computing tasks but where things differ is the Multimedia Content Creation side of AVL-MXE. The philosophy of AVL-MXE has always been "Install and Create" and the Audio and Video applications are set up and organized with a lot of thought toward having the system pre-configured and prepared for Content Creators who need a high-performance, solid, reliable Workstation OS to tackle projects both large and small. Great attention is paid to having mature versions of the DAW (Digital Audio Workstation) software and well-tested and useful Instrument and Effect 'Plugins' to maximize potential. The included 'Ardour' and the Demo version of the related 'Harrison Mixbus 32C' DAW provide Audio production capabilities from the Bedroom Producer to a full professional Commercial Studio Environments. Uniquely AVL-MXE also provides a LiveISO platform for the User to evaluate both excellent Open Source software as well as a growing list of Commercial Software demos. In the spirit of free choice AVL-MXE has a one-button option to remove all Demoware from the System for those who prefer an OS without Commercial options. The main focus of AVL-MXE is Audio Production but Video Content Creators and Graphics Designers will find a rich production environment as well with 'Avidemux', 'Cinelerra-GG', Kdenlive, 'Olive', 'OBS-Studio', 'Blender', 'GIMP', and 'Inkscape' included as well.

AVL-MXE Features at a Glance

- Based on MX Linux (powered by Debian/GNU Linux).
- Includes the phenomenal 'MX Tools' Utilities.
- XFCE4 Desktop Environment with custom AVL-MXE Theming.
- Extensive Audio/Video and Administrator-friendly Thunar Custom Actions.
- MX Fluxbox, Games, and most Office Utilities stripped out to optimize space for Audio/Video apps.
- Custom default AVL-MXE Realtime Preempt 'RT' Kernel.
- **NOTE default 'RT' Kernels do not support 3rd party AMD and nVidia Video drivers!*
- Optional AVL-MXE 'LL' Low Latency Preempt Kernels (*Support Video drivers through SGFXI).
- Optional Liquorix kernels for those who may want them and of course all MX Linux Kernel options!
- Tuned for best potential low-latency Audio performance (threaded IRQ's, rtirq-init)
- Robust Compilation and Development Environment for experienced Users and Packagers.
- A large amount of included '-dev' lib dependencies for Users to roll their own Updates.
- Seamless ALSA, JACK and PulseAudio integration through 'Qjackctl' and 'pajackconnect'.
- CPU Governor Set to 'Performance' by default.
- 'AVL-MXE Assistant' Utility to simplify optimal System setup.
- Fully supported and functional 'bundled' version of Ardour DAW.
- Commercial Demo of Harrison Mixbus32C.
- Commercial Demos of selected Audio Plugins.
- 'One-Click' removal of all Demo-ware for those who would rather not have Commercial options.
- Included Custom Packaging of Plugins not available in any other Repositories.

*There will occasionally be 'limited releases' of a customized 32bit version of AVL-MXE.. To be clear the 32bit x86 CPU architecture is now deprecated and many software applications are no longer developed for 32bit so this release is limited to special cases and older 32bit PC's. AVL-MXE 32bit lacks programs and features that are on the 64bit system. For this reason the 32bit version comes 'as-is' with absolutely NO guarantee to see consistent development and the security and updates are completely at the discretion of the packagers maintaining the included repositories. User beware!

Included Trusted Debian Repositories

AVL-MXE differs from MX Linux in it's usage of trusted 3rd party Repositories to provide more choices of Software Packages for the User to install. The MX approach is to provide many optional user-requested Packages within their own MX Repositories and this is an effective strategy that requires a lot of in-house Packagers to keep up with demand. AVL-MXE relies on carefully selected Repositories that are specifically created for users of Debian/GNU Linux (not Ubuntu PPA's) to provide much of the specialized Packaging that is expected in a Multimedia Content Creation context. These Repositories include:

- [AVL-MXE Kernel Repository](#) (*RT and LL Preempt Kernels maintained by Trulan Martin).
- [The Liquorix Kernel Repository](#) (*Optional Low latency Tuned Kernels)
- [The KXStudio Repositories](#) (*mainly used for Audio Plugins).
- [WineHQ Wine Repositories](#) (*Wine-Staging for use in Running Windows Audio Apps and Plugins)
- [Cinelerra-GG Repository](#) (*Provides Debian builds of the phenomenal 'GG' Fork of Cinelerra NLE)
- [Debian Docker Community Edition](#) (*Docker deployment platform for Debian Users)

Known Issues in AVL-MXE

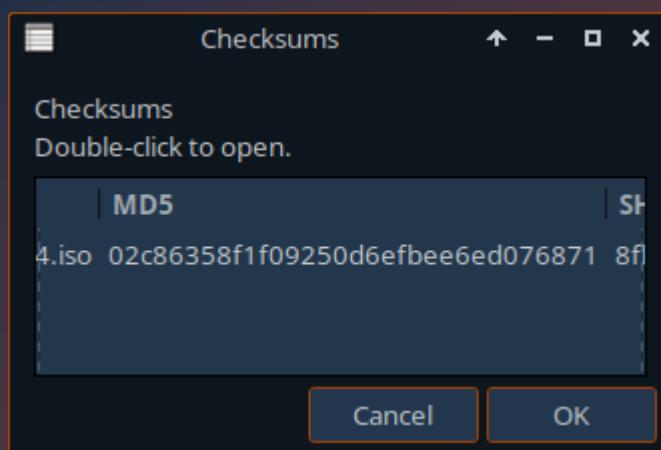
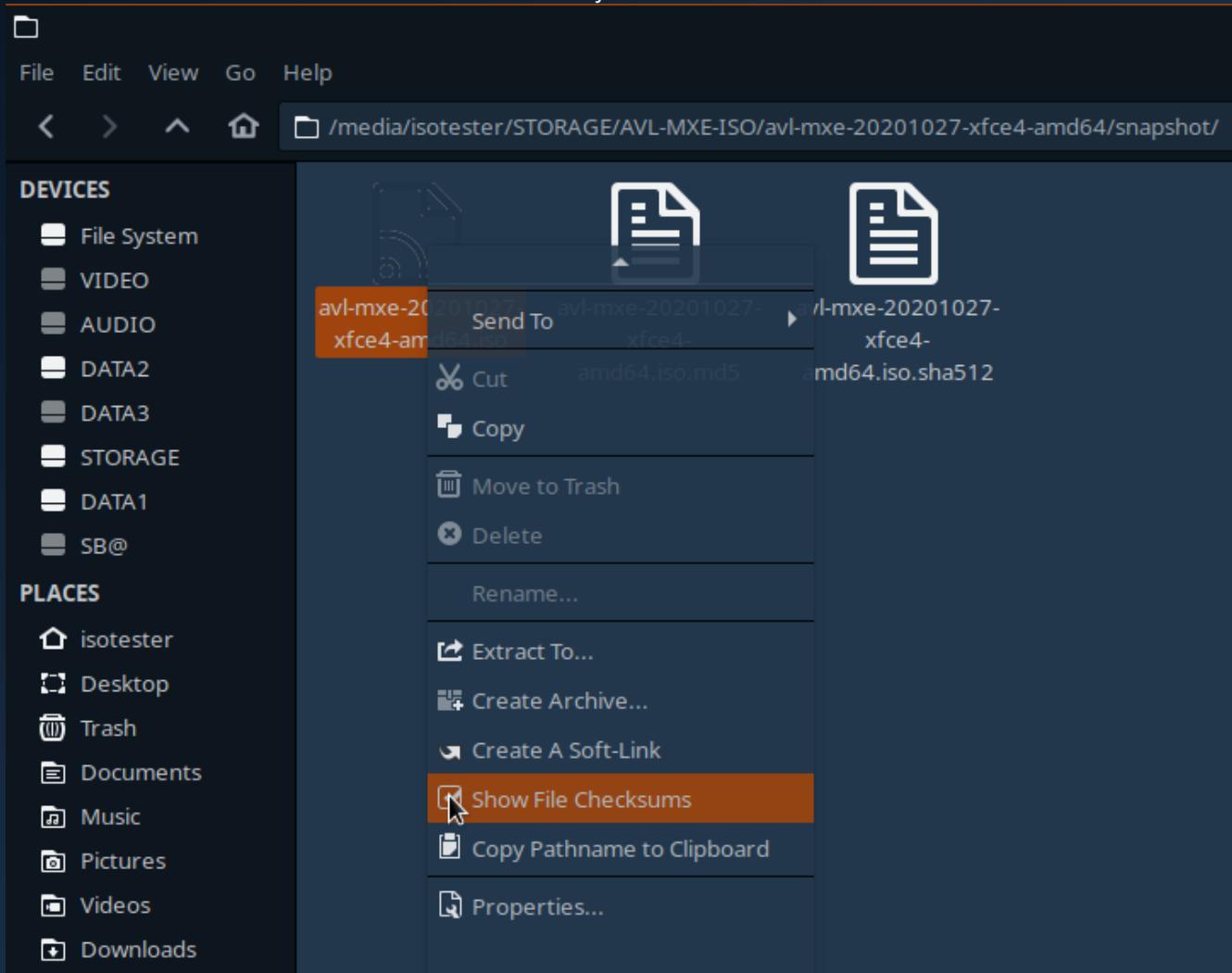
These are VERY early days in the migration of AVL-MXE to MX Linux and there is still much work to do to determine what features may overlap or even conflict with each other. It is hoped that each release will receive some useful feedback in order to streamline and improve future full releases. Before downloading or installing AVL-MXE the User should be aware of the following known issues:

- ➔ AVL-MXE is not well-suited to installs in Virtualized Environments (Virtualbox, VMWare etc.)
- ➔ The default 'RT' Kernel does not support 3rd party AMD and nVidia Video Drivers, this is expected.
- ➔ The ISO is about 3Gb in size, this is not BLOAT! Multimedia Apps and Plugins take up a lot of space!
- ➔ Aside from Custom Kernels there is not a Repository of Custom AVL-MXE Packages (yet).
- ➔ AVL-MXE is currently using the QT5 Config tool 'qt5ct' to apply GTK themes to QT5 Apps.
- ➔ There are still functionality overlaps between the MX Tools and the AVL-MXE Assistant.
- ➔ AVL-MXE uses 'gksu' instead of 'mx-pkexec'.
- ➔ AVL-MXE Assistant uses 'Mousepad' instead of 'Featherpad' for text file editing.
- ➔ The 'audioassault-plugin-demos' Package does not have all proposed demos included yet.
- ➔ VST3 Audio plugin support for Ardour is in VERY early development!

Downloading the AVL-MXE ISO File

It is VERY strongly recommended to only download AVL-MXE from the mirrors on the [**AVL-MXE Website**](#). This will ensure that you are getting the intended version of the ISO files and not something that has been maliciously tampered with. While AVL-MXE is in early development there may be a limited number of mirrors but this will likely expand by the time AVL-MXE is through the Release Candidate process. When you download the AVL-MXE ISO you will see that in the mirror download folder is the actual 'AVL-MXE-<year-month-day-DE-arch>.iso' file containing the operating system and two accompanying '.md5' and 'sha512' text files. You should download the both the 'iso' and both text files, you should be able to right-click and use 'Save target as' for the text files. Before running AVL-MXE Live or installing it on your computer you should verify that the 'md5sum' and 'sha512sum' of your ISO download matches the text files on the download server. This will ensure that you have a complete and proper download of the ISO as well as confirming that you haven't downloaded a compromised ISO.

To verify that the md5 and sha512 files match with your downloaded ISO you can simply right-click on the ISO file you downloaded and select the Custom Action to "Show File Checksums". This will open a new window that will take several seconds to calculate the MD5, SHA256 and SHA512 checksums and then show you the calculated values which will appear as long alphanumerical text strings. If these checksum text strings match the strings in the text files which accompanied the ISO download then you can be assured you have both a complete download and that the ISO file is legit and safe to use.

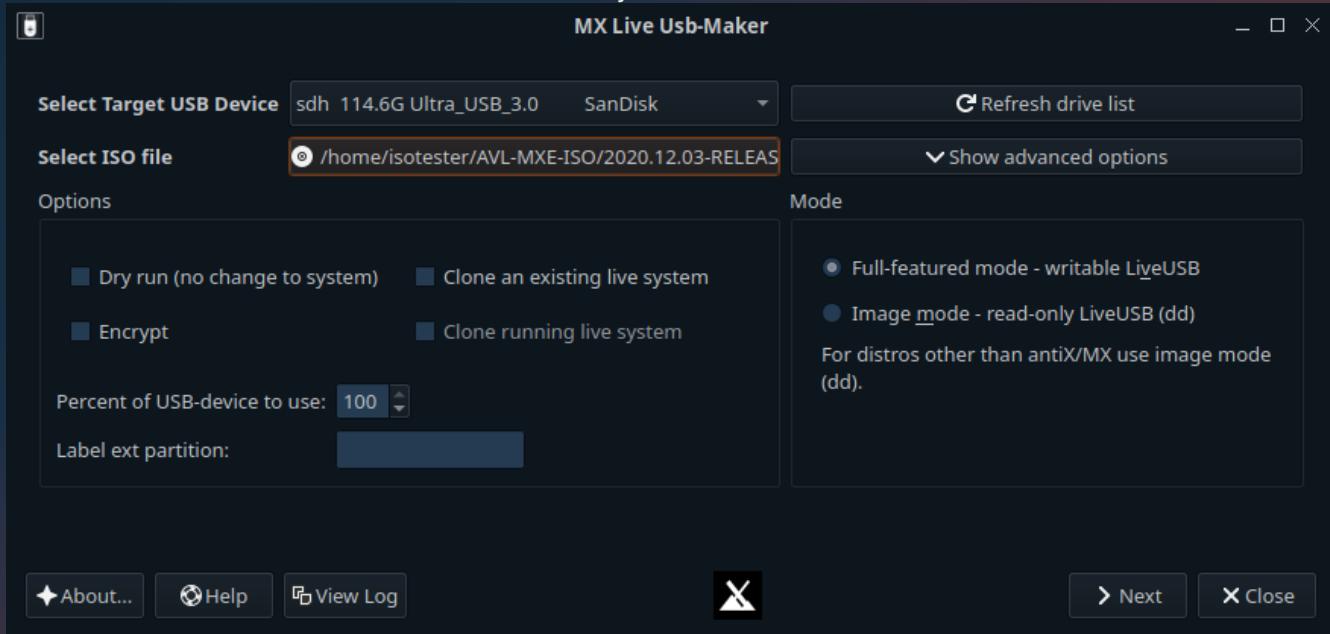
Checksum verification in Thunar:

Running AVL-MXE as a 'LiveISO'

With USB Keys so abundantly plentiful and cheap I strongly recommend only running AVL-MXE as a 'LiveISO' from a USB Key. Running LiveISO's from DVD Media should be considered a deprecated and obsolete method to effectively try a Live Linux Operating System these days. AVL-MXE can be run on USB Media as small as 4Gb and for the ultimate LiveISO experience with persistence (the ability to save changes made while running the Live session) I highly recommend using the 'MX Live USB Maker' Utility to create an AVL-MXE LiveISO. If you are not already using MX Linux then there are other options such as 'Unetbootin' although it will not create a persistent bootable USB key it will create a key which will enable you to try out and potentially install AVL-MXE. Diehard and experienced Linux command line gurus can also use the well-known 'dd' command to manually copy the AVL-MXE ISO file to a USB key. There are a number of other Utilities within Linux and on Windows to create bootable USB Keys but they are beyond the scope of this manual.

Once you have created a bootable USB Key you will need to plug it into to a USB port on your computer and use the Computers BIOS or UEFI firmware Utility to select the USB Key at boot time. A common hotkey is the 'F12' key to enter a boot device selection screen but every BIOS and UEFI Utility are a bit different so if F12 isn't the ticket consult your Computer's documentation or give 'er a Google! By default AVL-MXE should not require any login password to boot into the Desktop, if the User needs to logout then the Username and Password to log back in is 'demo' and for Root access the Password is 'root'. If you need help while running a LiveISO session then both the MX Linux and AVL-MXE PDF Manual files are right in the Openbox Menu!

Screenshot of MX Live USB Maker:



The Network Assistant for WiFi

Due to the staggering amount of computer hardware supported by the Linux kernel and the huge numbers of various networking chipsets that computers are equipped with it is becoming more and more difficult to guarantee that WiFi will work out of the box when you boot a Linux LiveISO. Some WiFi chipsets require some extra config or loading of specific kernel modules and even 3rd party installed firmware to function properly. To mitigate some of this and assist Users in getting WiFi working the MX-Tools Network Assistant is a valuable tool. Of course I can't provide hard and fast examples that will work for all hardware situations so this section will discuss the Network Assistant in generalities.

If you are running a LiveISO session you will find the Network Assistant in the 'MX-Tools' section either from the XFCE4-Panel or in the Whisker Menu, because it requires Root permissions you will need to enter the Password 'root' to run it. The Network Assistant's first Tab will show you which chipsets are found on your computer, depending on what kind of computer you have usually this will be one device for hardwired ethernet and a second WiFi device.. Of primary interest is Tab 2 or the 'Linux Drivers' Tab because it will show what drivers for your hardware are on the system, whether these drivers are loaded or not or if the drivers are blacklisted by some special module config files.

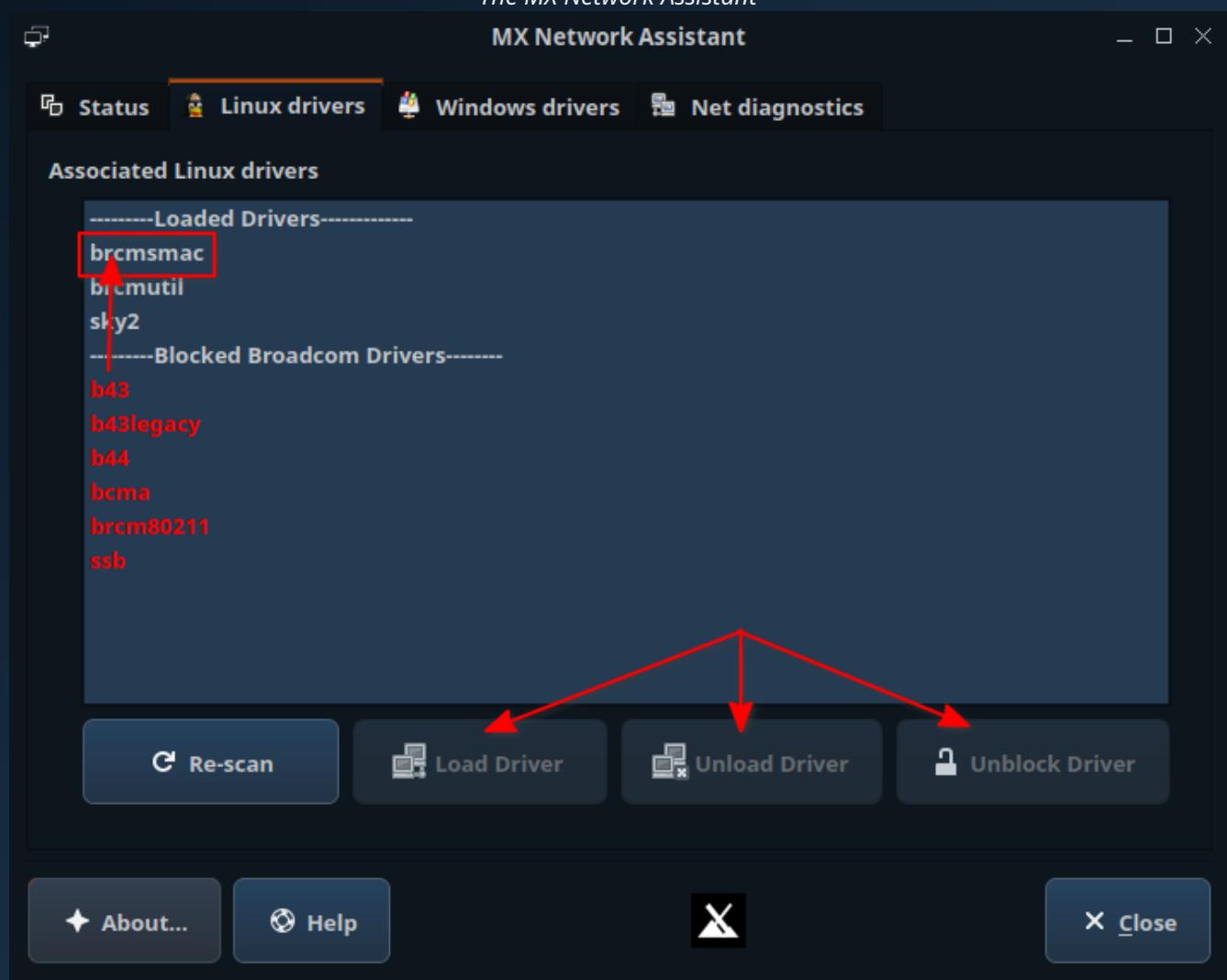
On the next page is a fairly common Broadcom example.. On this particular computer when I boot a default ISO of AVL-MXE the WiFi does not work because the 'brcmsmac' driver is blacklisted by default. In order to fix this I needed to use the 'Unblock' button which allowed the brcmsmac driver to load and enabled my WiFi to work. Usually if you don't have WiFi your Wired ethernet will work so it may take a bit of Google sleuthing from your Wired connection to determine what exact driver is required for your chipset.

A handy Terminal command you can use to determine what Networking hardware is on your computer and which drivers are loaded is this:

inxı -n

inxı -n running in a Terminal

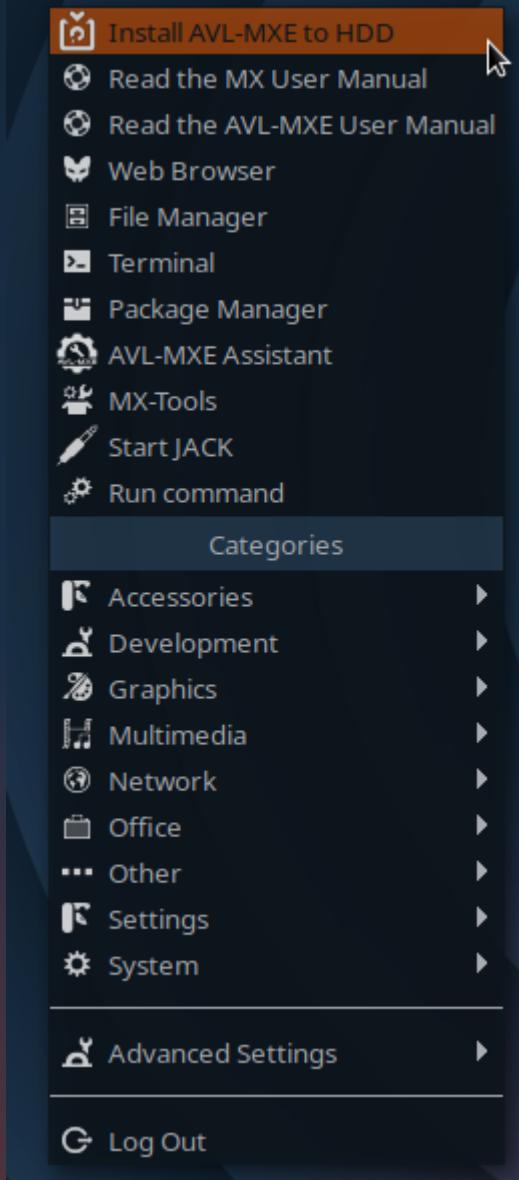
```
$ inxi -n
Network:  Device-1: Intel I211 Gigabit Network driver: igb
          IF: eth0  state: up speed: 1000 Mbps duplex: full mac: b4:2e:99:a9:81:1c
          Device-2: Realtek RTL8812AE 802.11ac PCIe Wireless Network Adapter driver: rtl8821ae
          IF: wlan0  state: up mac: d0:37:45:72:88:84
```



Installing AVL-MXE

AVL-MXE can be installed from a running LiveISO session to the computer hosting it by right-clicking, opening the Openbox Menu and selecting the 'Install AVL-MXE to HDD' entry at the top of the Menu which will launch the MX Installer. The Installer gives step by step Dialogs and the Installer window displays contextual Help text throughout the Installation process to answer any questions the User may have about the various installation options.

Screenshot of MX Linux Installer in Openbox Menu:



The AVL-MXE Assistant

Just like MX Linux provides its 'MX-Tools' to assist the User in detailed system settings AVL-MXE provides its own 'AVL-MXE Assistant' to help with various settings that pertain both to setting up an effective Multimedia Workstation and to keeping things working reliably during long projects. The Assistant is a simple GTKDialog Utility with 5 Tabs.

Tab 1 (or 'Quick Setup') provides the following functions:

This Tab is primarily for consolidating the applications that set up the eye-candy of your system all in one easy to use area.

Here you can quickly set your XFCE4 GTK and Icon Themes.

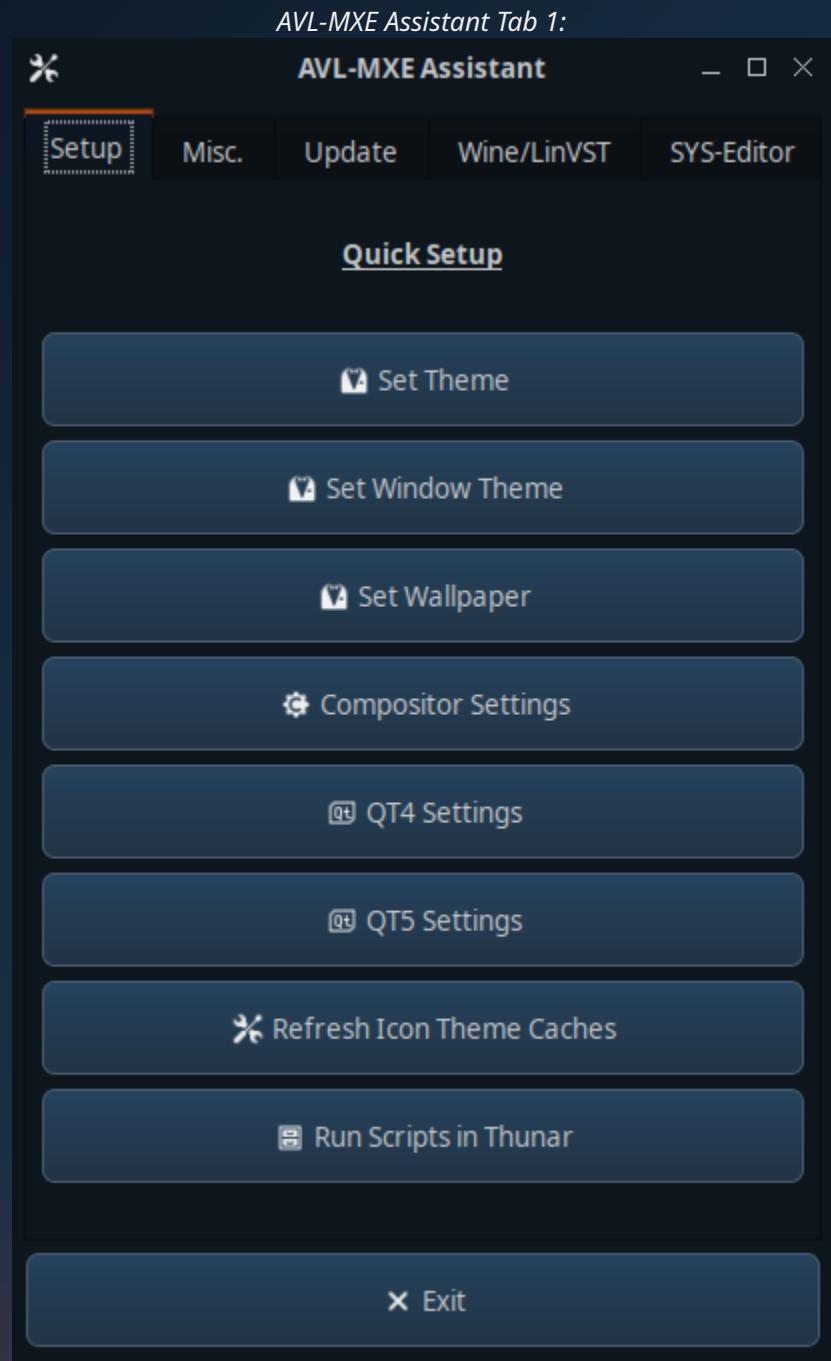
Select your Openbox Window theme.

Make adjustments to the Window effects with the Compton Compositor.

Although most popular QT4 applications have been almost completely ported to QT5, for those running legacy applications that still use QT4 you can adjust theme settings for both QT versions from the Assistant.

Additionally while it is not a common requirement to refresh the caches for all Icon Themes at once this is an 'easy button' solution in AVL-MXE.

A little-known tweak for the Thunar File Manager is the ability to run scripts by clicking on them and AVL-MXE has this functionality set up for you by default.. in the case you need to reset this no need to Google, simply do it from the AVL-MXE Quick Setup Tab!



Tab 2 (or 'Misc') provides the following functions:

Checking the System resource consumption with 'bpytop' a terminal-based utility to display CPU, Memory, Disk Space, Running Processes and much more.

Setting the running CPU Governor to a different setting than the default of 'performance'. This will only change the governor for your running session and it will revert to the default 'Performance' governor on your next boot. For more detail on how to change your default CPU Governor to another value see the section below on 'Tab 4'.

Launching the XFCE4 Session-Startup Dialog to choose which Applications run at Login. This can improve system performance by eliminating running programs that aren't needed. As an example, disabling Bluetooth if your computer doesn't have Bluetooth capabilities.

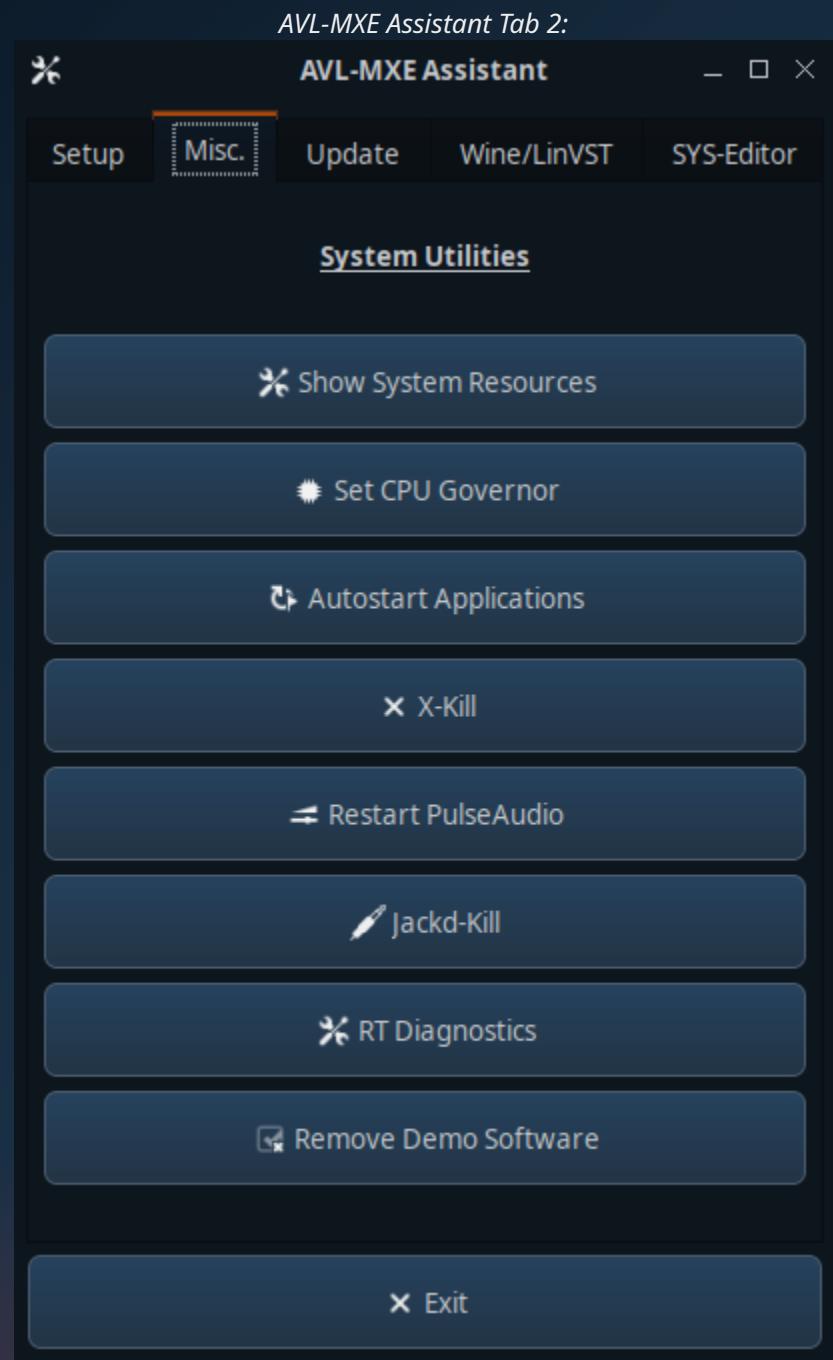
Killing the window and process of a stuck or hung program. Move the 'X' over the Window of the program you want to force to close and left-click to kill it.

Restarting the PulseAudio sound server in the rare event that it doesn't properly create its needed JACK Source and Sink Clients.

Killing any background jackd or jackdbus processes that may have been accidentally started by a JACK-aware program. The evidence of this would be if you open the Qjackctl application to start JACK and see that it is already running..

Launching a System RT Diagnostic program which will verify crucial System settings for best low latency Audio potential.

Removal of ALL Commercial Demo Applications with a single click.

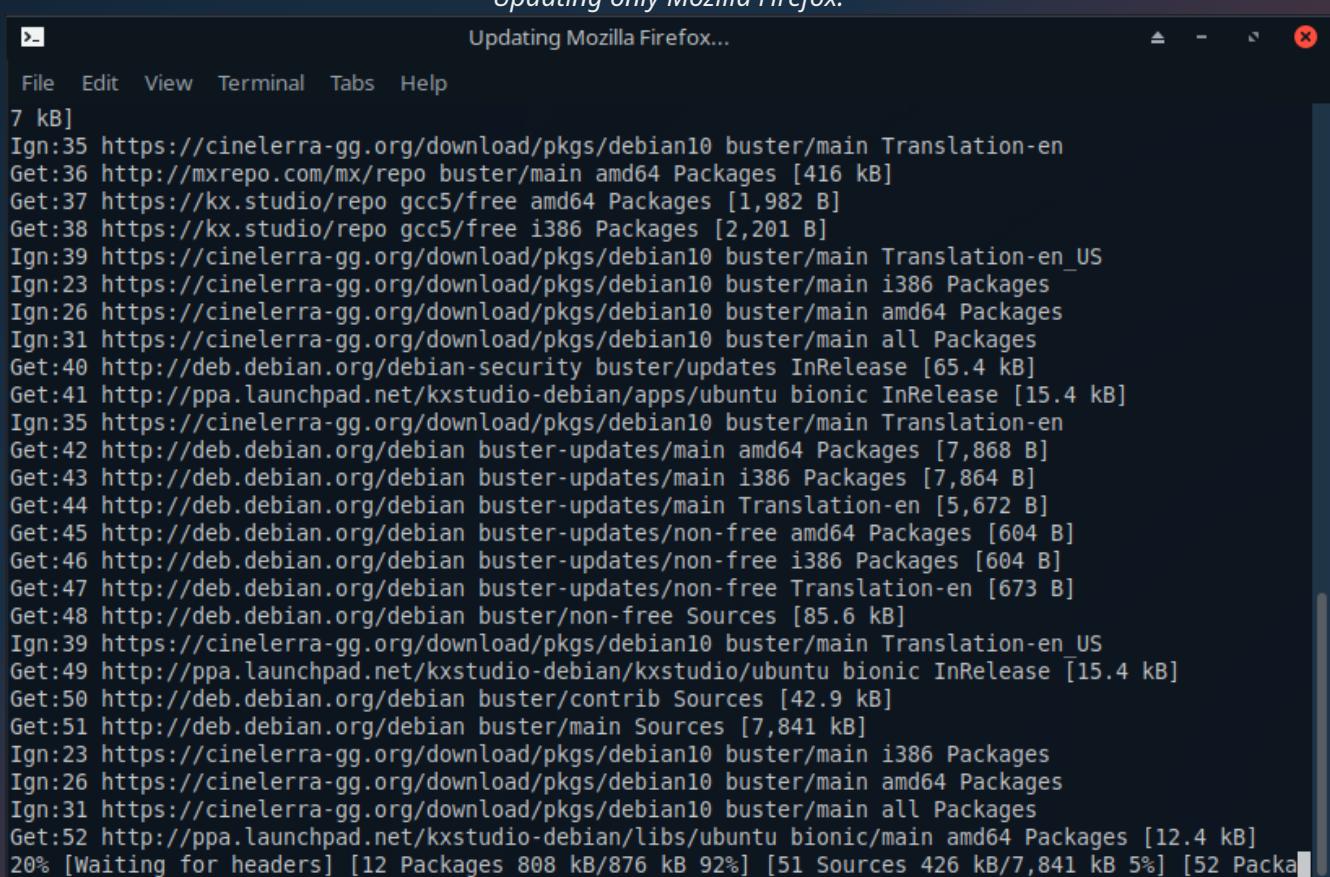


Tab 3 (or 'Update') provides the following functions:

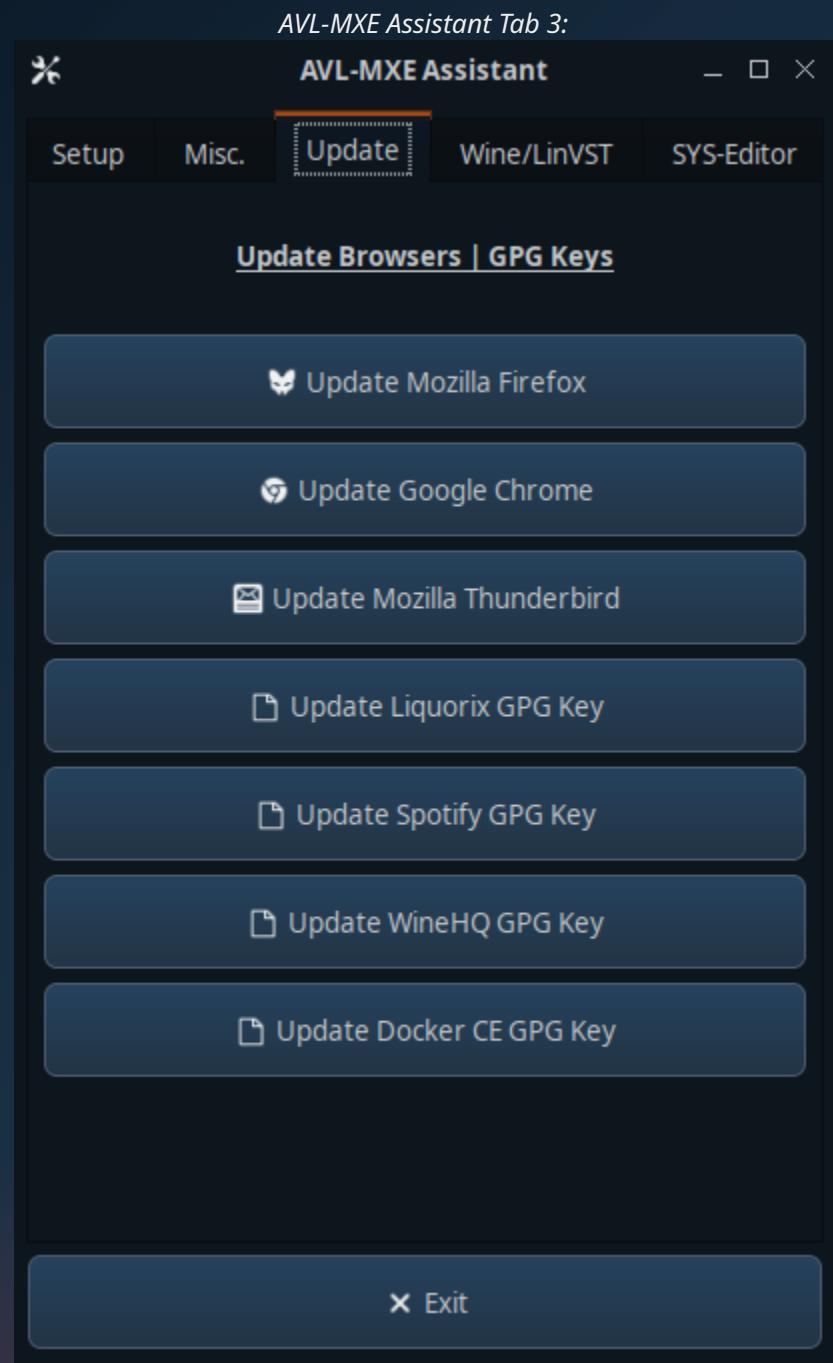
A paradigm where AVL-MXE differs from most regular Desktop Linux Distributions is it's handling of updates when the System is being used for 'mission critical' projects. If you are creating a Multimedia work that stretches over weeks or months or if you are doing paid production work for clients you want to be very careful about making needless system-wide changes to a system that is performing exactly how you want. The other side of this how to keep the system security up to date especially when it comes to the main Internet interface; the Web Browser. AVL-MXE answers this by providing a one-button option to update ONLY the Browser and Email client and spare the system from so-called blanket upgrades while in the midst of Production.

A second potential security issue is when you have added 3rd party Repositories to your system and they have updated their GPG keys without you knowing it, when you do go to do a system-wide update and the Package Management complains that the GPG Keys for the Repository have expired you will no longer be able to upgrade software from that Repository until the GPG Key is updated. To address this common issue the AVL-MXE Assistant automates updating the GPG Keys for the various extra Repos with a a one-button click to retrieve and update the GPG Keys.

Updating only Mozilla Firefox:

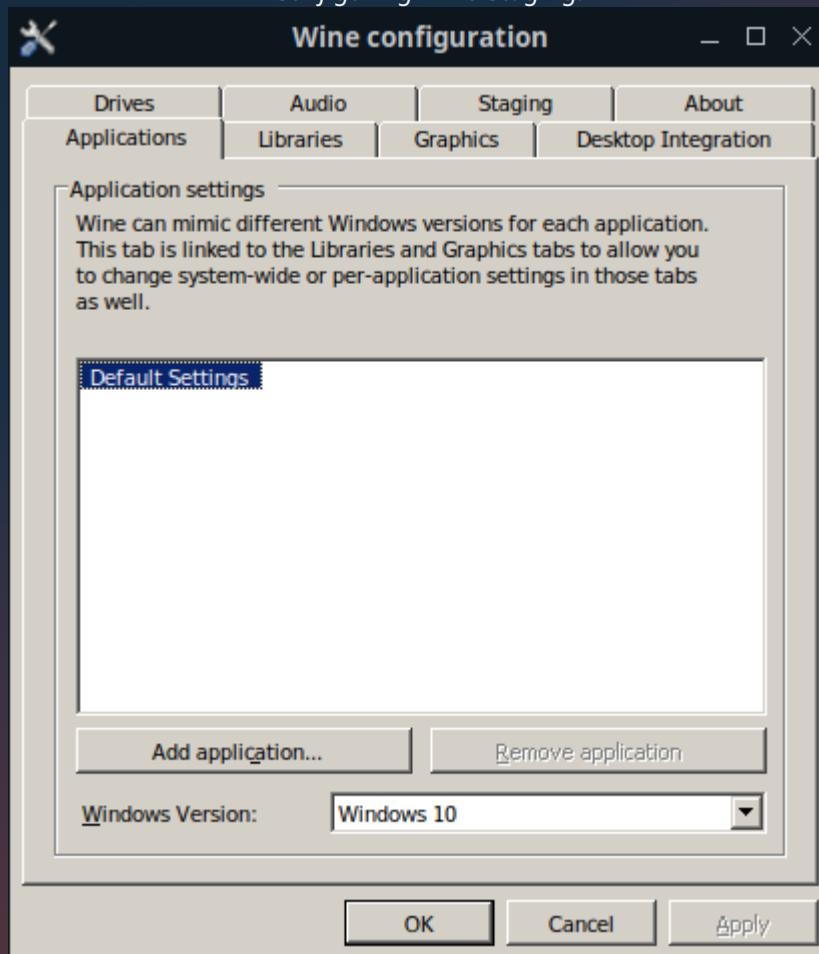


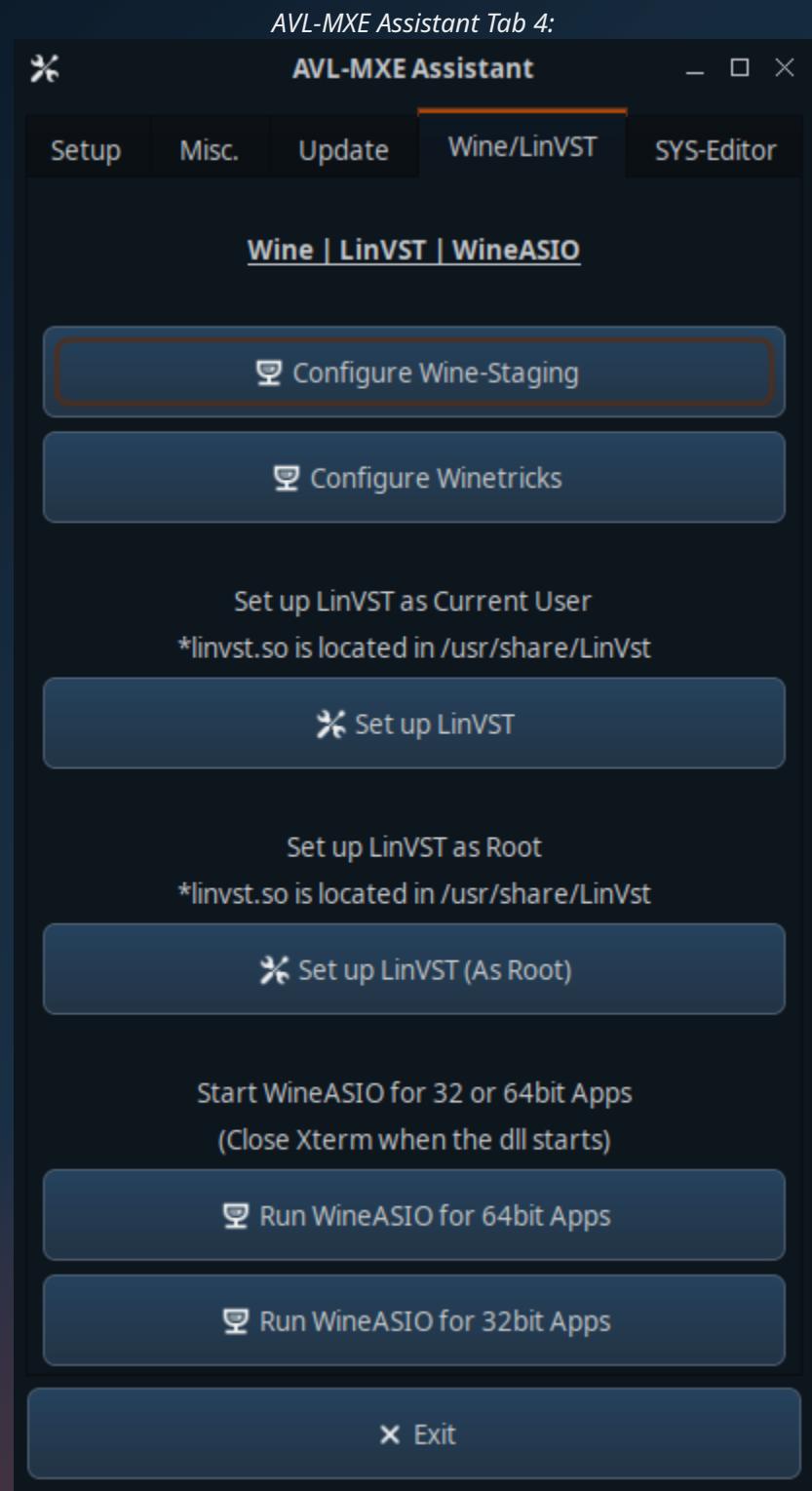
```
Updating Mozilla Firefox...
File Edit View Terminal Tabs Help
7 kB]
Ign:35 https://cinelerra-gg.org/download/pkgs/debian10 buster/main Translation-en
Get:36 http://mxrepo.com/mx/repo buster/main amd64 Packages [416 kB]
Get:37 https://kx.studio/repo gcc5/free amd64 Packages [1,982 B]
Get:38 https://kx.studio/repo gcc5/free i386 Packages [2,201 B]
Ign:39 https://cinelerra-gg.org/download/pkgs/debian10 buster/main Translation-en_US
Ign:23 https://cinelerra-gg.org/download/pkgs/debian10 buster/main i386 Packages
Ign:26 https://cinelerra-gg.org/download/pkgs/debian10 buster/main amd64 Packages
Ign:31 https://cinelerra-gg.org/download/pkgs/debian10 buster/main all Packages
Get:40 http://deb.debian.org/debian-security buster/updates InRelease [65.4 kB]
Get:41 http://ppa.launchpad.net/kxstudio-debian/apps/ubuntu bionic InRelease [15.4 kB]
Ign:35 https://cinelerra-gg.org/download/pkgs/debian10 buster/main Translation-en
Get:42 http://deb.debian.org/debian buster-updates/main amd64 Packages [7,868 B]
Get:43 http://deb.debian.org/debian buster-updates/main i386 Packages [7,864 B]
Get:44 http://deb.debian.org/debian buster-updates/main Translation-en [5,672 B]
Get:45 http://deb.debian.org/debian buster-updates/non-free amd64 Packages [604 B]
Get:46 http://deb.debian.org/debian buster-updates/non-free i386 Packages [604 B]
Get:47 http://deb.debian.org/debian buster-updates/non-free Translation-en [673 B]
Get:48 http://deb.debian.org/debian buster/non-free Sources [85.6 kB]
Ign:39 https://cinelerra-gg.org/download/pkgs/debian10 buster/main Translation-en_US
Get:49 http://ppa.launchpad.net/kxstudio-debian/kxstudio/ubuntu bionic InRelease [15.4 kB]
Get:50 http://deb.debian.org/debian buster/contrib Sources [42.9 kB]
Get:51 http://deb.debian.org/debian buster/main Sources [7,841 kB]
Ign:23 https://cinelerra-gg.org/download/pkgs/debian10 buster/main i386 Packages
Ign:26 https://cinelerra-gg.org/download/pkgs/debian10 buster/main amd64 Packages
Ign:31 https://cinelerra-gg.org/download/pkgs/debian10 buster/main all Packages
Get:52 http://ppa.launchpad.net/kxstudio-debian/libs/ubuntu bionic/main amd64 Packages [12.4 kB]
20% [Waiting for headers] [12 Packages 808 kB/876 kB 92%] [51 Sources 426 kB/7,841 kB 5%] [52 Packa
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Tab 4 (or 'Wine | LinVST | WineASIO') provides the following functions:

Linux users have long known about the Windows compatibility software layer known as 'Wine', this incredible software enables Linux users to seamlessly run many Windows applications on the Linux platform. A side benefit of Wine is that it also enables Windows Audio applications and 'VST' Audio plugins to work on Linux as well and AVL-MXE focuses on this functionality. A special version of Wine called 'Wine-Staging' is used for its cutting edge features and this tab of the Assistant enables the user to open the Configuration dialog for Wine-Staging, to enable extra hidden Wine features with a helper program known as Winetricks. In the specific use case of Windows VST Audio plugins a handy utility called 'LinVST' is used to scan and convert Windows '.dll' Plugin files into Linux-friendly '.so' files. When you run a DAW Plugin host like Ardour it will then see and utilize the Windows Audio Plugins just like they are Linux Audio Plugins. Of course not all Windows Plugins are supported but a good many are. The AVL-MXE Assistant makes using LinVST's conversion utility very easy (fully explained [here](#)). Lastly most professional Audio applications in Windows use a low-latency sound server known as 'ASIO'. In AVL-MXE we are using the Jack Audio Connection Kit (JACK) as a low latency sound server and with a utility called 'WineASIO' we can expose ASIO Audio drivers to Windows Audio applications through JACK. This involves running an ASIO '.dll' file in Wine-Staging and the last two buttons are to launch either a 32 or 64bit version of WineASIO depending on the architecture of the Windows Audio application you are using. Wine-Staging on AVL-MXE is set up to run both 32 and 64bit Windows Programs and Plugins. This is covered in more detail [here](#).

Configuring Wine-Staging:

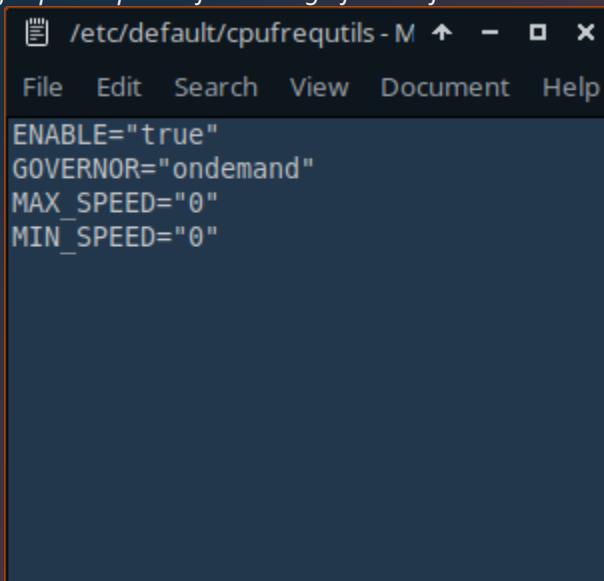


Tab 5 (or 'SYS-Editor') provides the following functions:

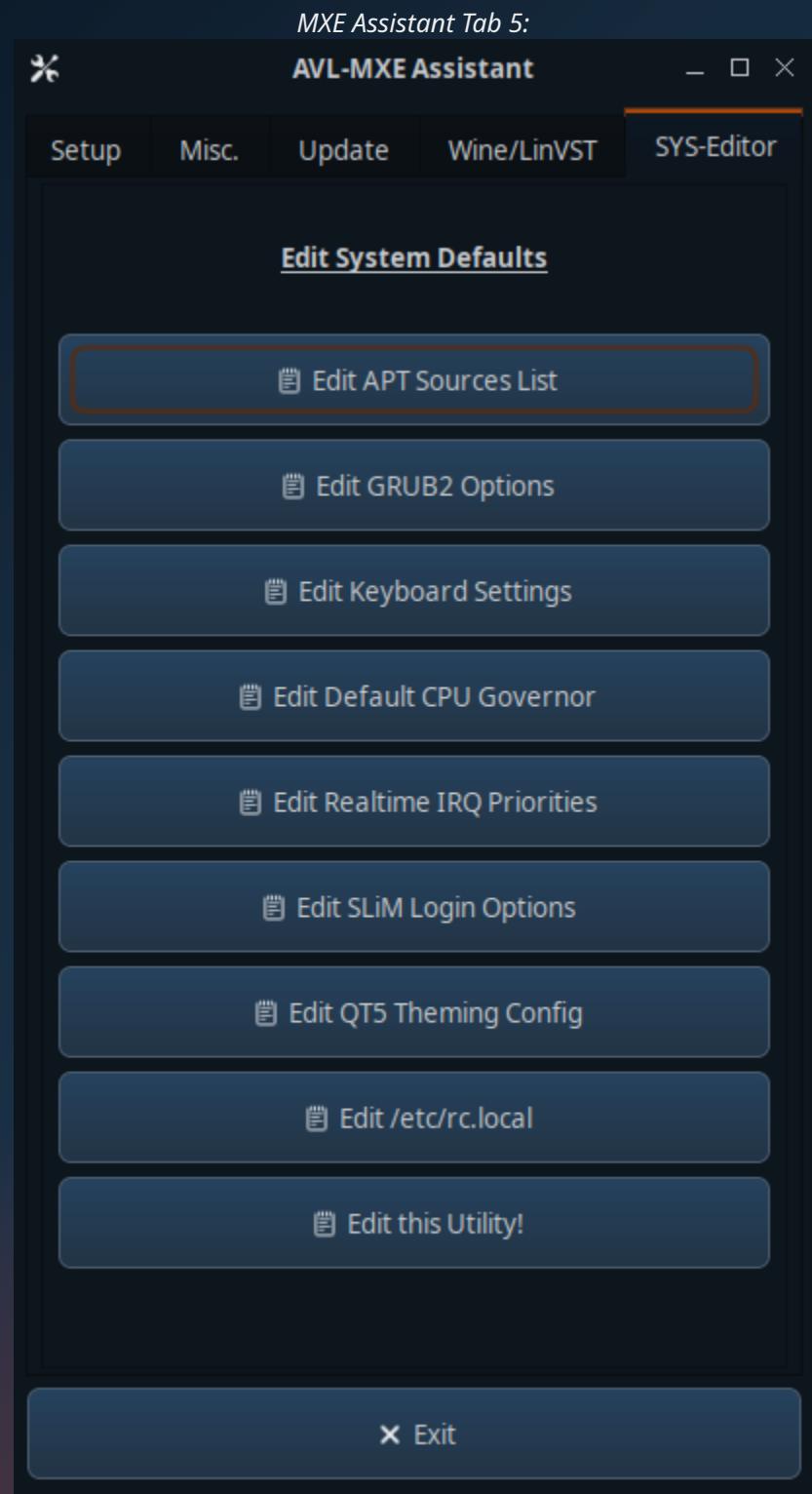
It should be stressed that this Tab is really for Linux Users that are experienced System Admins who know their way around deep System configuration files. The SYS-Editor will directly open system-wide config files in Mousepad for the User to edit. If you are unclear how to edit these files or what the changes will do to your System then you should definitely not make changes with this Utility! Once edits are made they need to be saved in Mousepad before closing.

One common need to edit a system-wide file may be to set the system default CPU Governor, this parameter determines which CPU scaling and speed Governor is used at boot unless changed by the User (see 'Set CPU Governor' covered in the section on Tab 1 above). For Audio and Video work the 'performance' Governor is recommended to make the CPU as responsive as possible and assist in providing the lowest potential Audio latencies. If you are using AVL-MXE in a Studio environment or are using it most of the time for Content Creation then you probably want to leave the default Governor set to 'performance'. However there are also downsides to running a performance governor by default if you don't really require it. More CPU heat, less battery life and in cutting edge multiple core CPU systems 12 cores and up it is possible that running the performance governor all the time could introduce instability. In these situations you may want to set the default CPU Governor to 'ondemand' and then switch to 'performance' only if needed for Audio and Video work. The 'Edit Default CPU Governor' button on Tab 4 will allow you to edit /etc/default/cpufrequtils and in the example below the default has been changed from 'performance' to 'ondemand'.

Cpufrequtils opened for editing of the default CPU Governor:



```
ENABLE="true"
GOVERNOR="ondemand"
MAX_SPEED="0"
MIN_SPEED="0"
```



The Kernel Conundrum

On any Linux system the Kernel is the core that everything runs on, it provides the framework that connects all the Hardware in your computer to the Software applications to use. The better match a Kernel is to your individual computer the better your system will work. The Linux Kernel is absolutely mindblowing in the huge amount of Hardware it supports over various needs from old PCs to the latest Smartphones. In a case like AVL-MXE we are hoping to support anything from new computers to machines that are more than ten years old. Old computers are excellent candidates to set up as dedicated recording ‘appliances’ and even old Single and Duo Core machines can easily record several tracks of Audio quite easily. When we are trying to support computers over such a span of age and additionally provide the best low latency performance for Audio recording it becomes difficult for a single choice of Linux Kernel to be all things to all people.

The primary focus of AVL-MXE is to be a Multimedia Workstation and enable the user to create content with the best possible performance. To this end I provide a customized Kernel with ‘full preemption’ also known as an ‘RT’ Kernel. RT Kernels provide the best potential to give us the low Audio latencies we require but they are somewhat like racing engines and may not be the best choice for all computers, they also have a limitation of not being open to the installation of 3rd-party Video drivers by AMD and nVidia so if the Kernel Xorg AMD Drivers are not to your liking or you need better nVidia support then the default RT Kernel in AVL-MXE not going to be the best choice.

The first thing to determine is if everything is working as you want and expect, if your Hardware is all supported and Software is all behaving as you expect then my suggestion is to leave the Kernel as it is and not make any changes. A common fallacy is that a newer Kernel is a better Kernel and that is often not the case, if your system is well-supported and you are confident that the Kernel has all of the appropriate security patches then installing a newer Kernel could introduce new issues and actually have a detrimental effect. The old adage “if it ain’t broke don’t fix it” is a good rule to follow!

If you require a change from the default AVL-MXE Kernel than there are a few options to look at. First there is an alternate AVL-MXE ‘lowlatency’ Kernel that still features ‘partial preemption’ and allows for the installation of nVidia Video drivers. To find this Kernel to install open the Synaptic Package Manager and enter ‘linux-image-lowlatency’ and ‘linux-headers-lowlatency’ in the ‘Quick filter’ and make sure you install the matching version numbers for each, it is suggested for security purposes to install the most recent version. Another great alternative is the ‘Liquorix’ Kernel and it can be searched in Synaptic with the terms ‘linux-image-liquorix’ and ‘linux-headers-liquorix’ again paying attention to installing matching version numbers.

XFCE4 with Openbox (new)

One of the greatest attributes of Linux is the ability to fine-tune the Graphical Desktop Environment to maximize efficiency across a wide cross-section of new and old computer hardware. AVL-MXE has long utilized the XFCE4 Desktop Environment which has been well-known as a mid-weight option combining a decent balance of convenience and efficiency however as Desktop and Laptop computers get more powerful XFCE4 has tended to get more resource-heavy with each release to the point I decided to intervene and replace the XFCE4 Window Manager (xfwm) and the XFCE4 Desktop Utilities (xfdesktop) with the much lighter and well-known 'Openbox' Window Manager. The modular nature of XFCE4 makes this customized hybrid possible and with the performance gains come a few caveats and key differences to be aware of:

- Openbox has it's own menu that is accessed by right-clicking on the Desktop.
- You can choose using the quick Openbox menu or the searchable XFCE4 Whisker Menu
- The Openbox menu can be modified by text-editing the 'obmenu-generator' schema file.
- Openbox does not 'manage' the Desktop *so it does not provide for icons on the Desktop*.
- Settings for Openbox are handled by the Openbox Configuration Manager (obconf)
- Desktop wallpaper is handled by the lightweight application 'Nitrogen'
- The XFCE-panel is retained allowing access to usual Panel and Systray functions.
- Log out and Shutdown is handled by a custom utility independent of XFCE4.



Slim Login Manager

AV Linux features 'Slim' as its default login manager. Slim has a very light system footprint and is still quite configurable by editing its configuration file in /etc/slim.conf. The example below will cover the most popular configuration request: autologin.

You can open the Slim configuration file for editing from the 'SYS-Editor' tab of the AV Linux Assistant.



To enable autologin two separate variables must be changed in slim.conf. Scroll down the file to find the following line:

```
# default_user
```

To set yourself as the default User remove the '#' comment from the beginning of the line and then add your Username, USERNAME is used here as an example:

```
default_user USERNAME
```

If we leave the file like this then on next login it will automatically enter your Username but still require your password, to have autologin work fully you need to edit the autologin line:

```
# auto_login no
```

Once again remove the '#' comment and change the 'no' to a 'yes' like this:

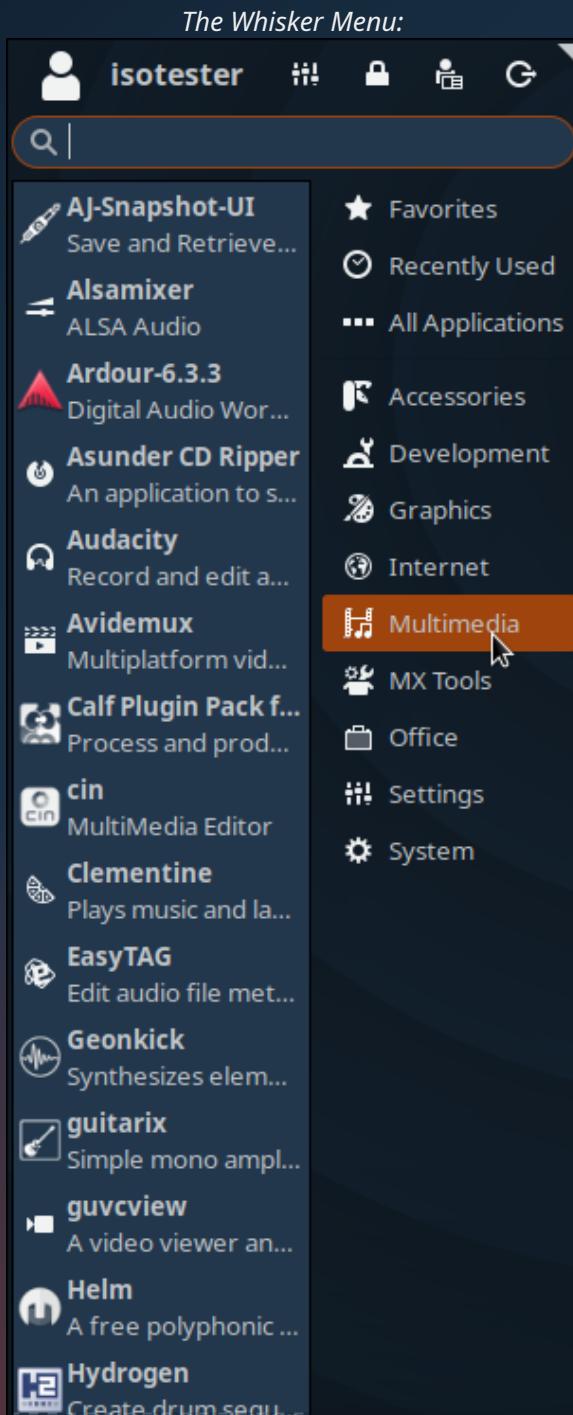
```
auto_login yes
```

When you have completed editing the slim.conf file click 'Save' in the Mousepad Text Editor and autologin should be active on your next login.

***PLEASE NOTE! - Slim does NOT support remote login, if you require remote login it is recommended to install 'lightDM' from the Debian repositories and configure it as the default login manager.**

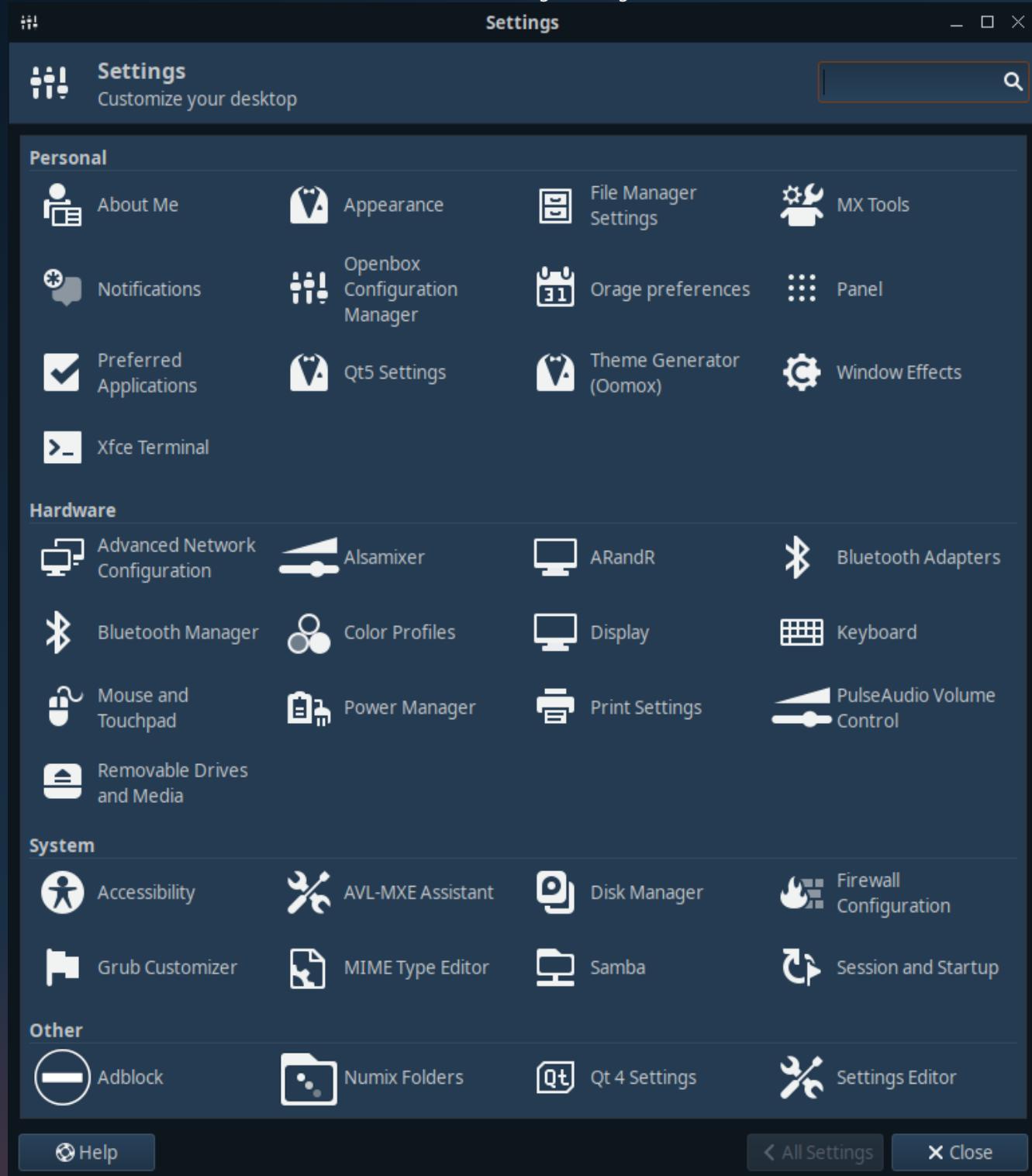
Getting Around in XFCE4

AVL-MXE uses the XFCE4 Desktop Environment for its great blend of functionality and efficiency. The XFCE4 'Whisker Menu' allows you to browse Applications as you would in a regular Menu as well as providing a Search bar that you can type the name of the Application into. Right-clicking on the Menu button and selecting 'Properties' will allow you to tweak the Whisker Menu Settings.

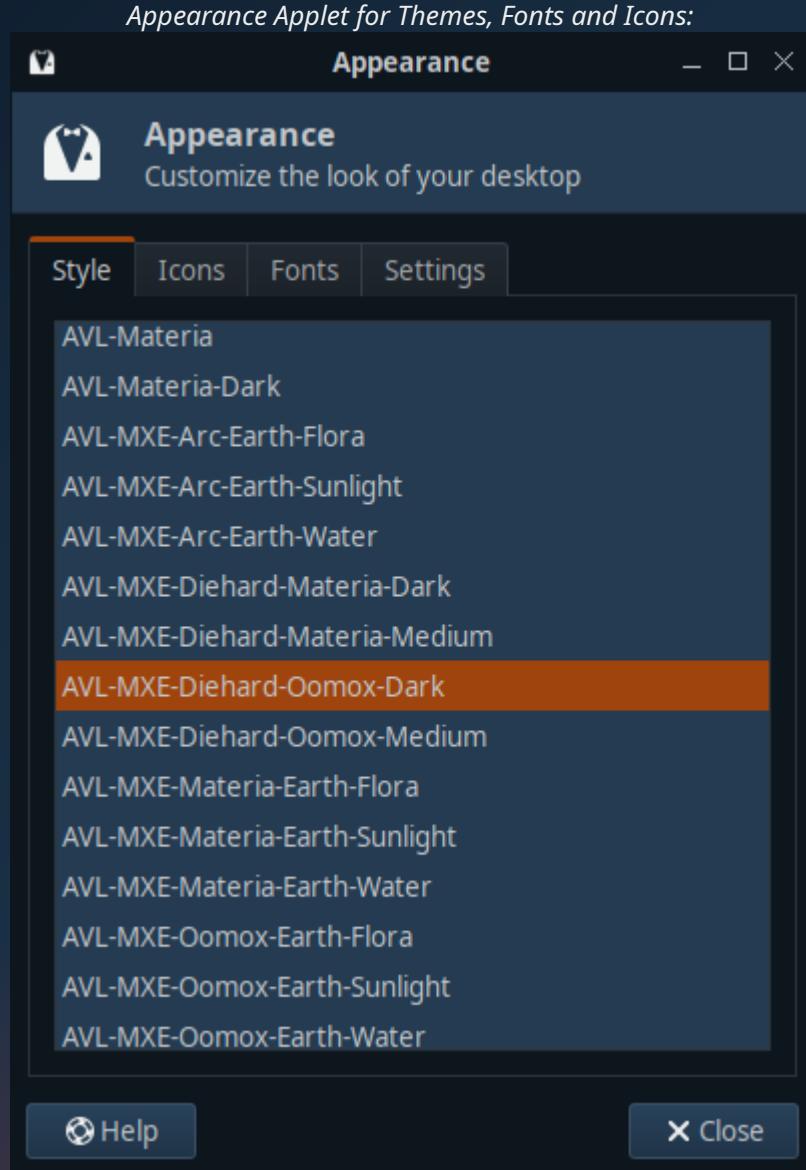


The settings for XFCE4 are accessed by using the 'Settings Manager'. Find it by either typing 'Settings' in the Whisker Menu search bar or navigate to 'Settings' → 'Settings Manager'.

The XFCE4 Settings Manager:

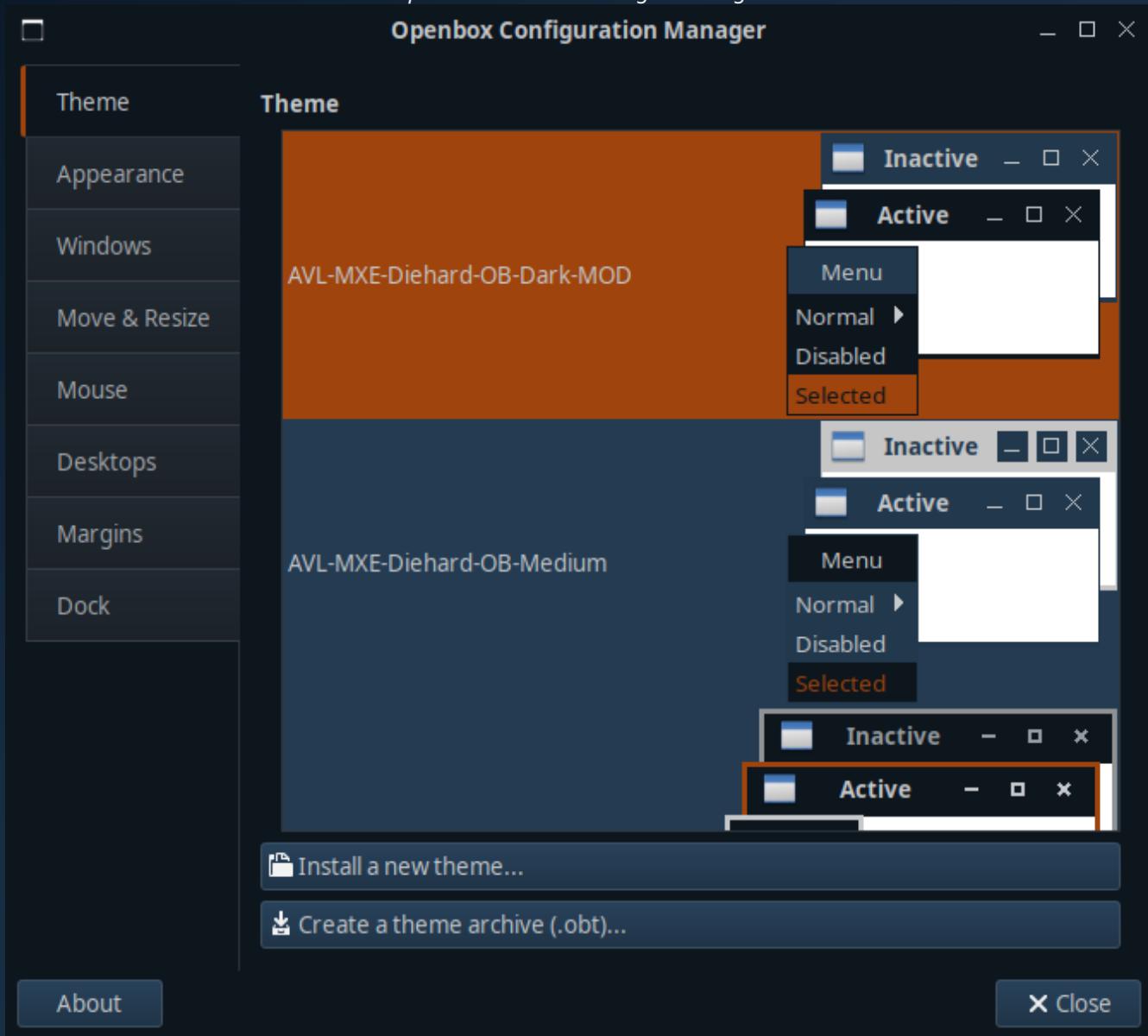


You can change how the system looks with the 'Appearance' settings. This will allow you to set the GTK theme, system icons, system fonts and some menu related items. AVL-MXE comes pre-loaded with a large amount of themes and colors to choose from.

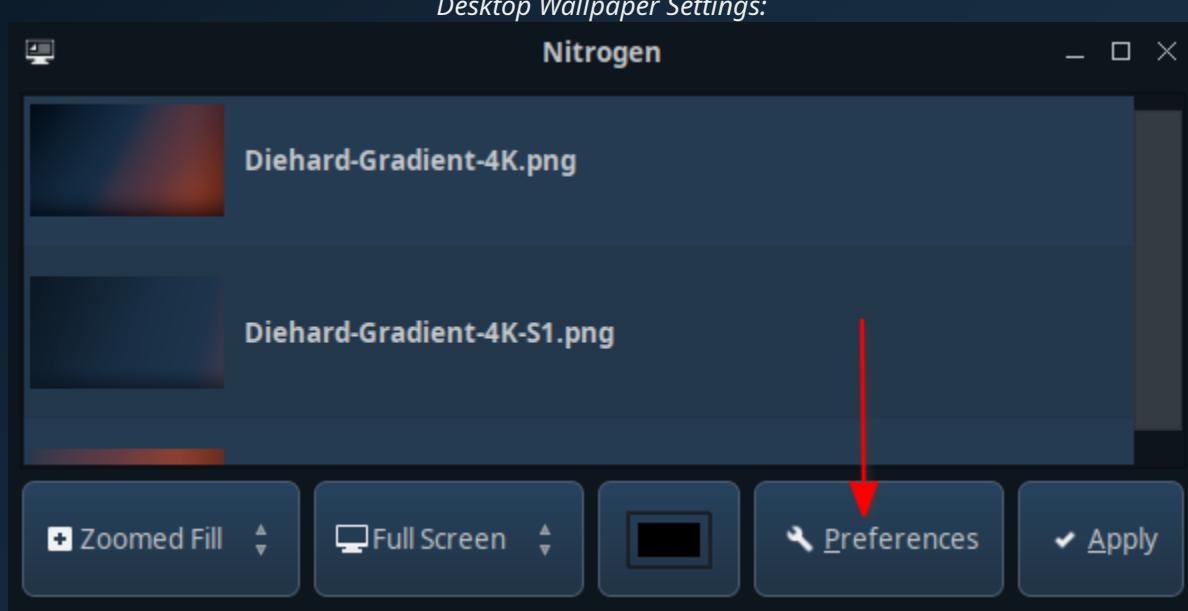


The Openbox Window Manager themes are set in the 'Openbox Configuration Manager' .

Openbox Window Manager Settings:



Change your Desktop wallpaper and other settings with the 'Nitrogen' wallpaper application. It allows you to set wallpaper images for single screen or individual wallpapers for dual-head setups.



The 'Preferences' button will allow you to select how the listed wallpapers appear and add the directories containing the images you want to use for Desktop backgrounds.

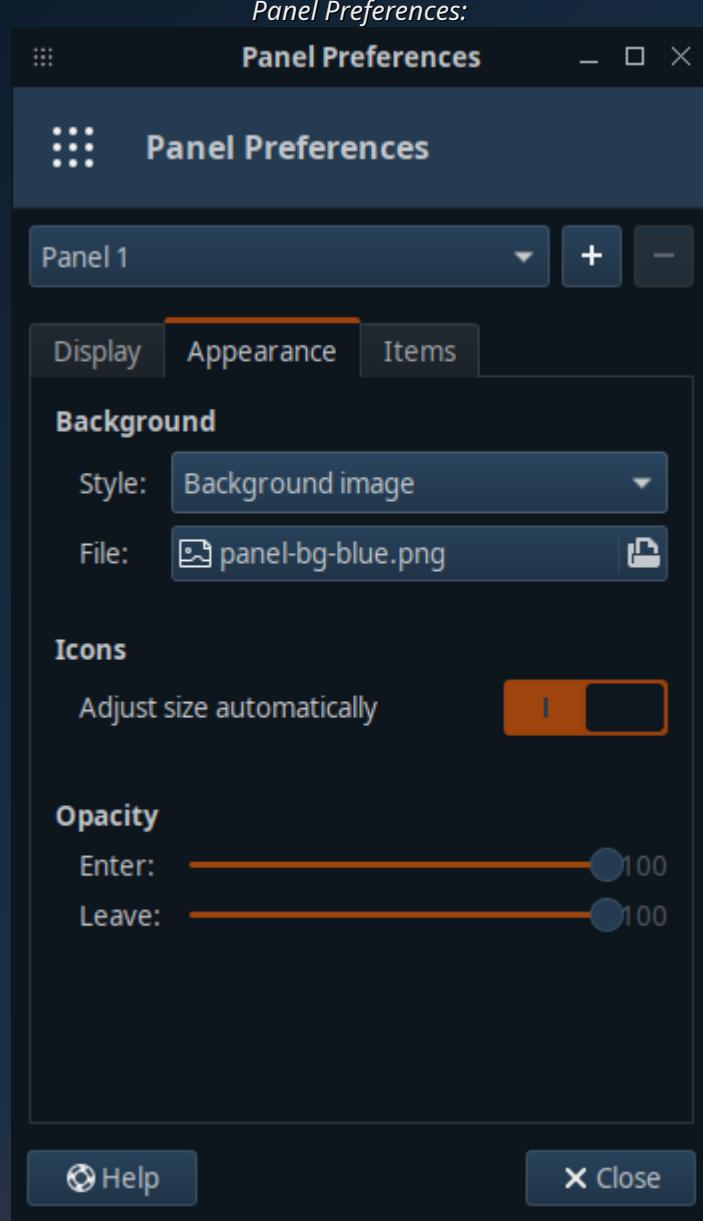
The XFCE4 Panel at the bottom of the Desktop screen combines access to the menu with program launchers, a window menu, PulseAudio sound mixer, notification tray, system clock and session logout buttons. By default the menu is set up to look like a “Taskbar” but right-clicking on any item on the Panel and selecting ‘Panel’ → ‘Panel Preferences’ will open a window to configure the Panel however you want.

Panel Left Side: Menu and Launchers



Panel Right Side: Window Menu, PulseAudio, Systray and Logout

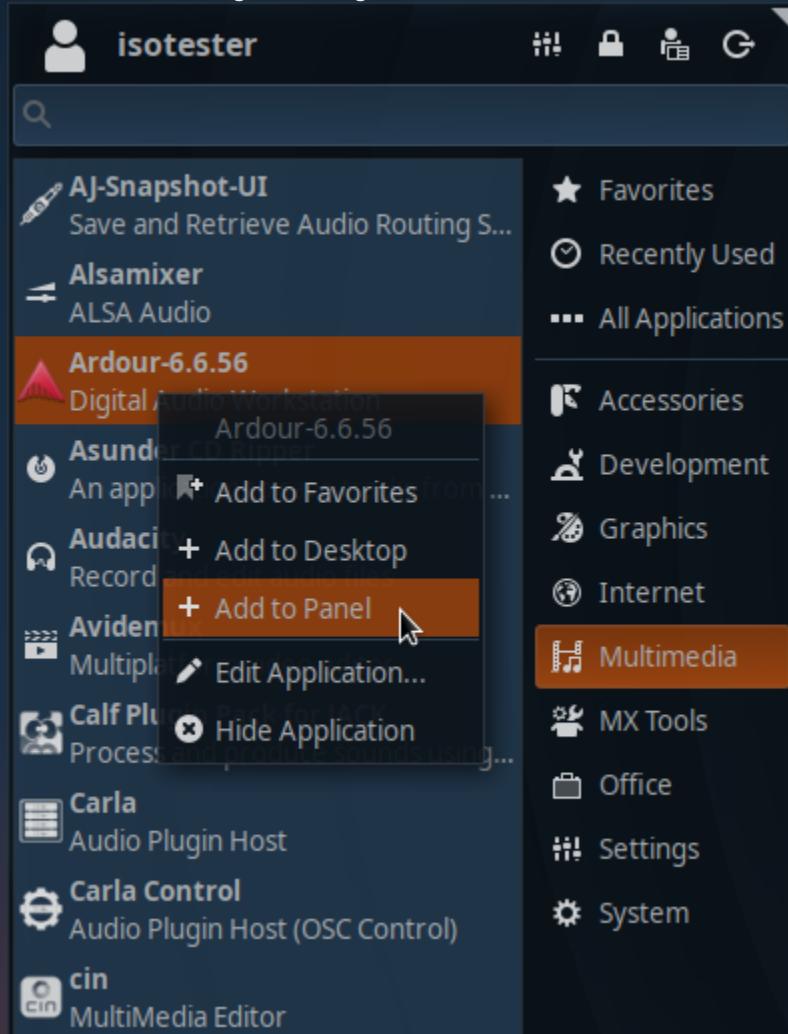




It is common for users to want to take application launchers from the Whisker menu and add them to the Panel. This is actually routinely necessary for the Ardour and Mixbus32C DAWs. Most applications retain their launcher properties and names when updated and once added to the Panel they don't need changing. Ardour and Mixbus32C generate launchers containing their version numbers as part of the Application name so when you update Ardour or Mixbus32C it will unfortunately update the launcher as well so your existing Panel launcher will no longer work after the update. We will use Ardour as an example of adding a Menu launcher to the Panel.

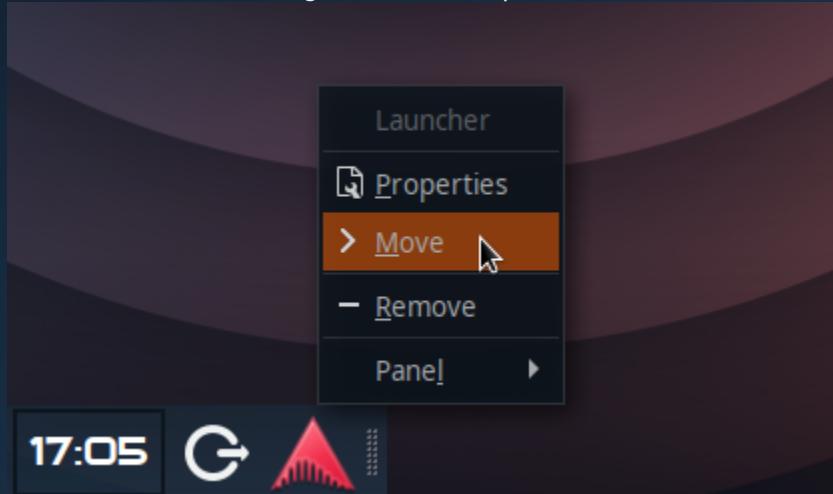
First find the launcher you want to add in the Whisker Menu and then right-click on it which will present ' + Add to Panel' as one of the options..

Right-clicking on Whisker Menu:



When you add the launcher to the panel it will appear to the far right at the very end of the Panel which of course is most likely not where you want it to be. In order to place the launcher in a different position within the Panel you will need to enable it to 'Move' so it can be dragged to the desired position. To do this right-click on the new launcher and a '→ Move' option will be available. When you select the launcher with the mouse cursor and start to drag it a vertical red line will appear that will help you line it up to its new position the Panel.

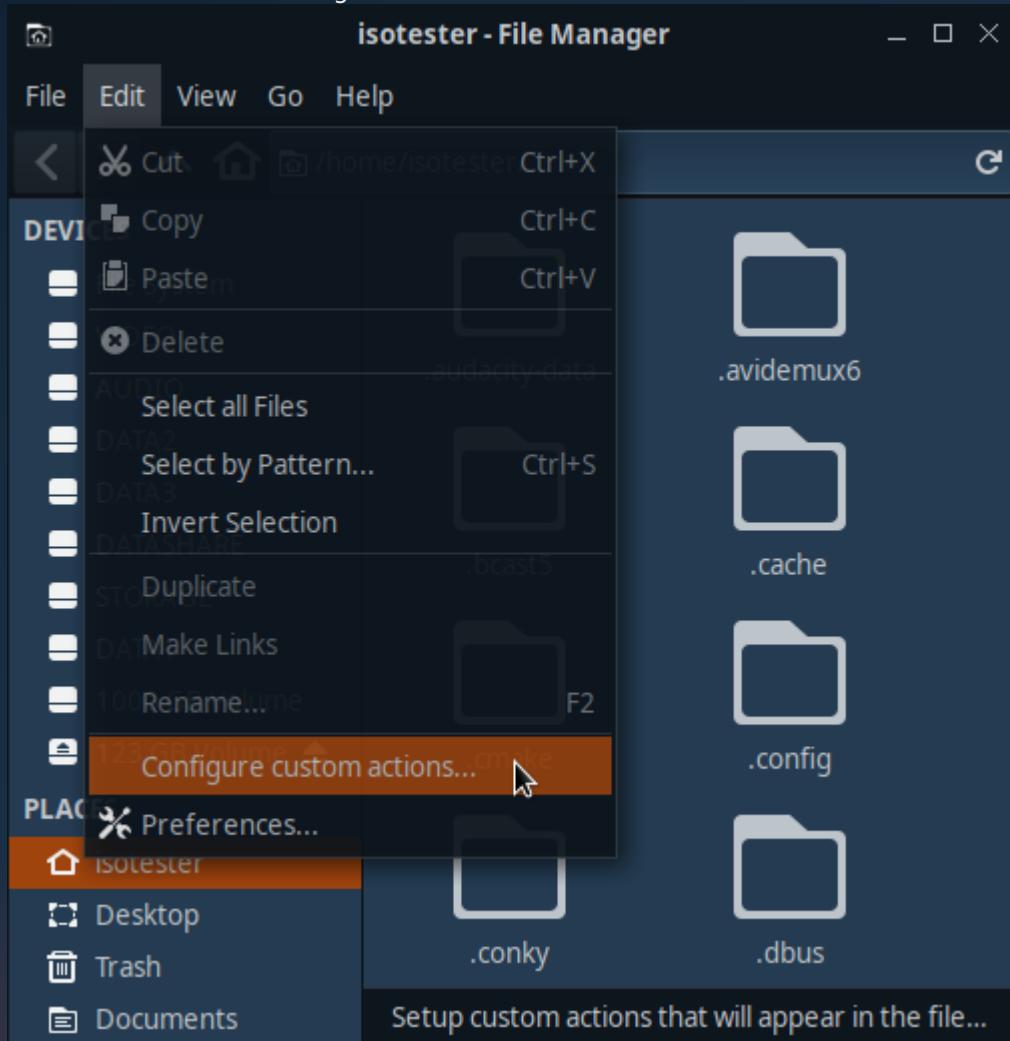
Right-click 'Move' option:

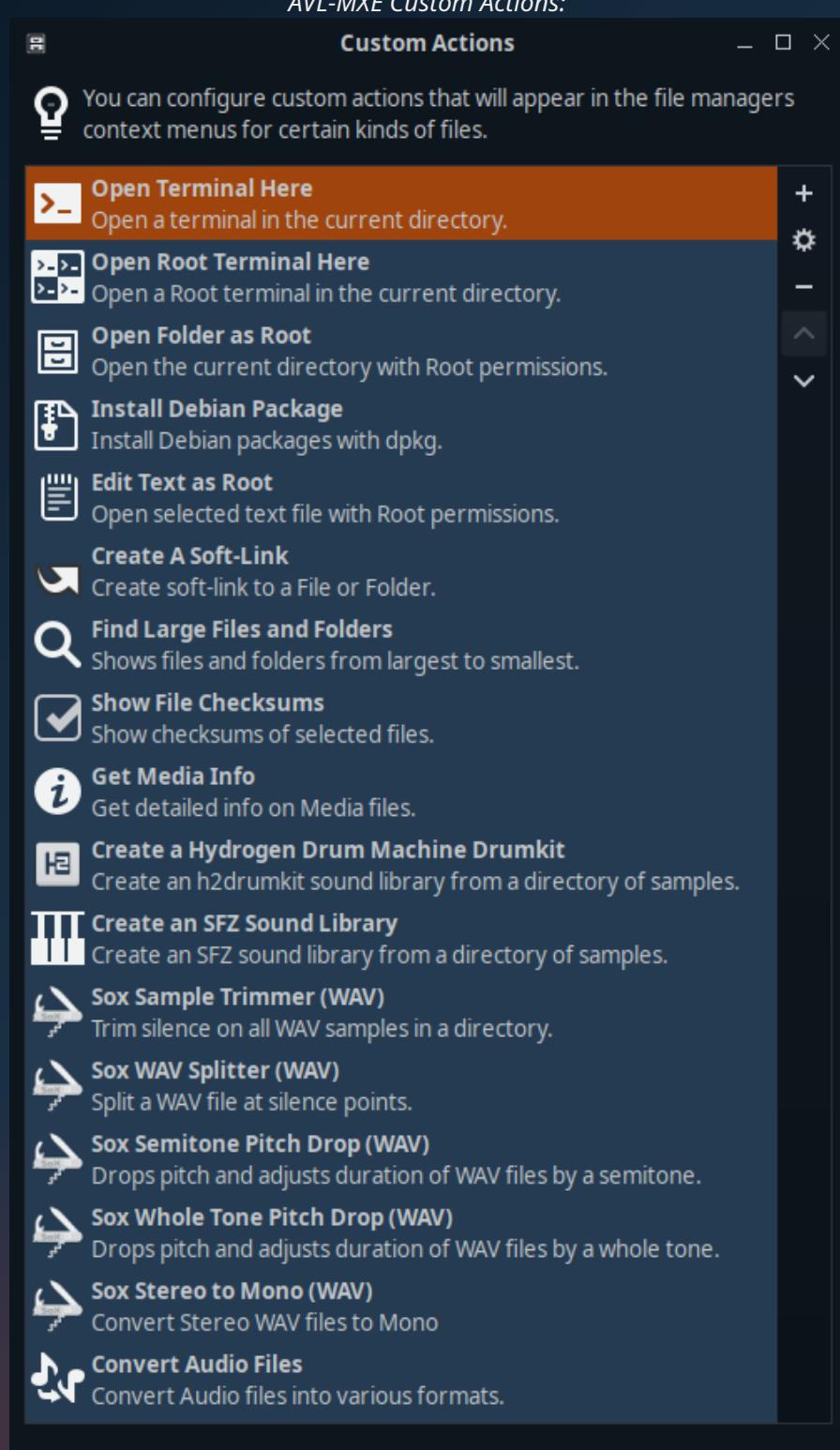


Thunar File Manager

The Thunar File Manager included in AVL-MXE has been customized and extended with Custom Actions to do MUCH more than simply manage files. As you navigate the System you will see there are numerous options when you right-click on the Desktop and in folders , more different options appear when you right-click on certain file types. Custom Actions enable many tasks including system administration, media playing, media conversions, networking and much more! A summary of the Custom Actions is shown below, most options are self-explanatory. Some will be explained further on following pages.

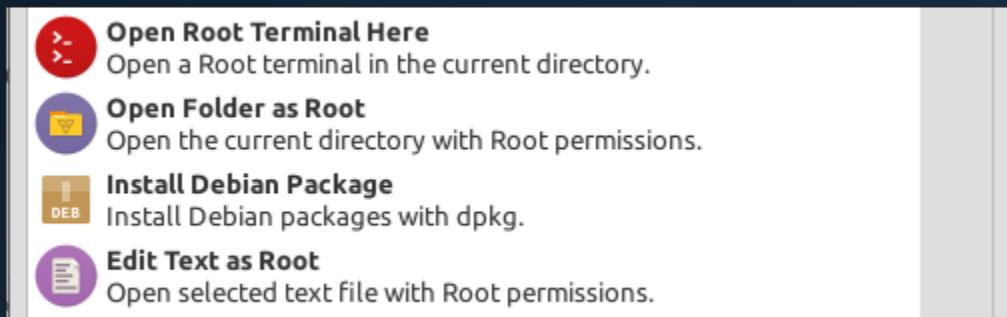
Accessing the Custom Actions Menu in Thunar:



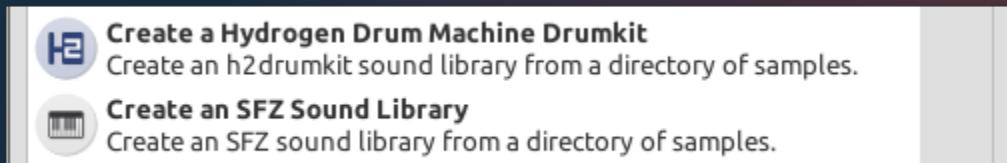


Root Custom Actions (USE CAUTION!) :

For those who need to administrate their system and make changes outside of their home folder in the file system some handy Root Custom Actions are provided. These allow to open a Root Terminal within the folder you're viewing, open the current folder with Root privileges, Install a Debian package from Thunar (simple install, does not resolve external dependencies) and to Edit configuration text files as Root.

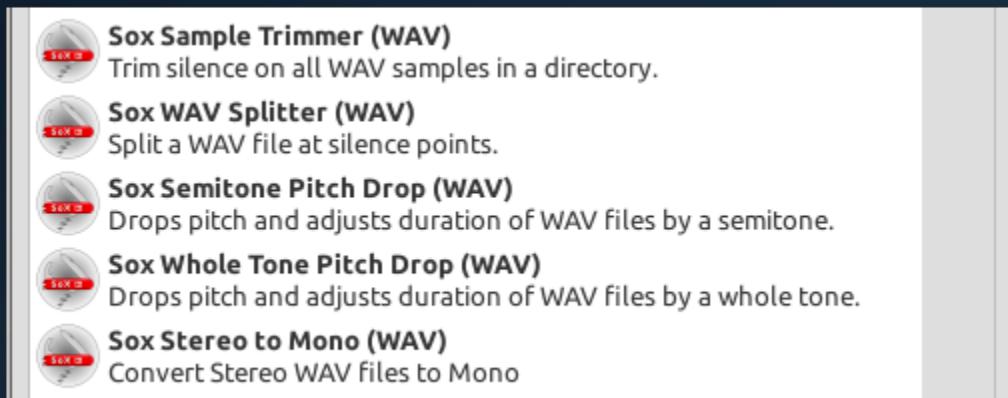
**Create SFZ Sound Libraries and Hydrogen Drumkits :**

From within Thunar you can launch interactive scripts to create SFZ and Hydrogen sound libraries. It is essential that you have your sound samples organized and properly formatted for the target application in a folder first.



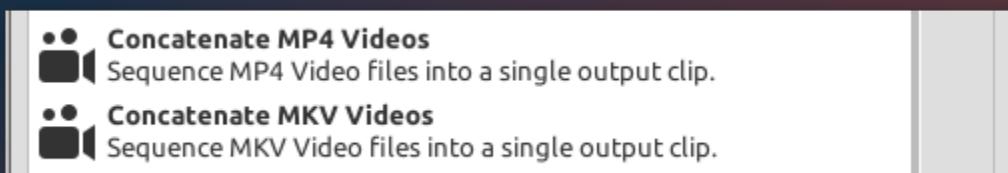
Split, Trim, Transpose and Convert WAV Samples with SoX Utilities :

This is a brand new feature in AVL-MXE 2020 and will probably require further future polishing but it currently allows for quick n' dirty manipulation of WAV files to prepare them for use in Sound libraries all from the comfort of Thunar! The SoX scripts themselves can be found in `usr/local/bin` and can be modified there for those who are savvy with SoX command line.



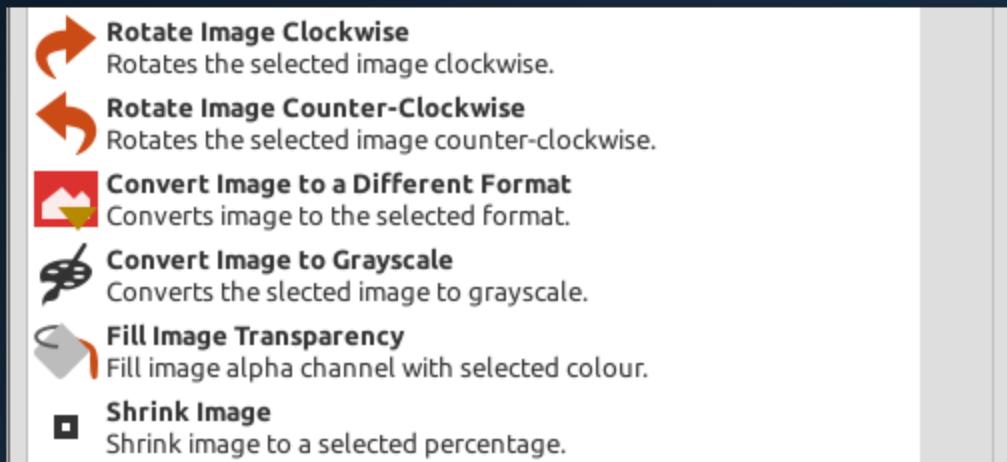
Concatenate MP4 and MKV Video files :

You can join MP4 and MKV Video files together, for example you have finished clips you want to combine without having to reopen them in a Video Editor and re-encode them with the resulting quality loss. If the clips are the same resolution, have been encoded with the same encoder and settings and if they are the same Audio sample rate you can use these Concatenate Custom Actions to join them without re-encoding.



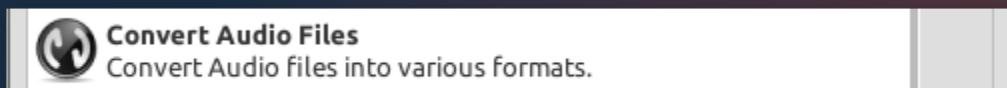
Manipulate, Convert and Work with Image files :

There are some newly added Custom Actions to quickly and easily work with pictures and image files.



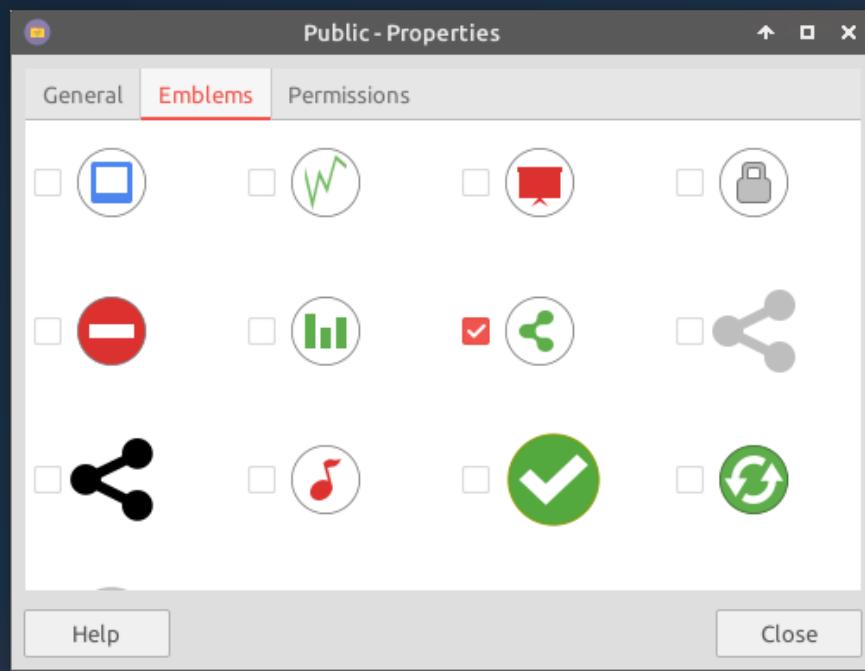
Convert Audio Files With PACPL :

You can quickly and easily convert Audio files from one format to another with the integrated PACPL Custom Action. When you right click on an Audio file in a folder you will see the option to "Convert Audio Files" as one of the menu options. Pretty much all common options for conversion are supported.



One-Click Samba Sharing on Your Network :

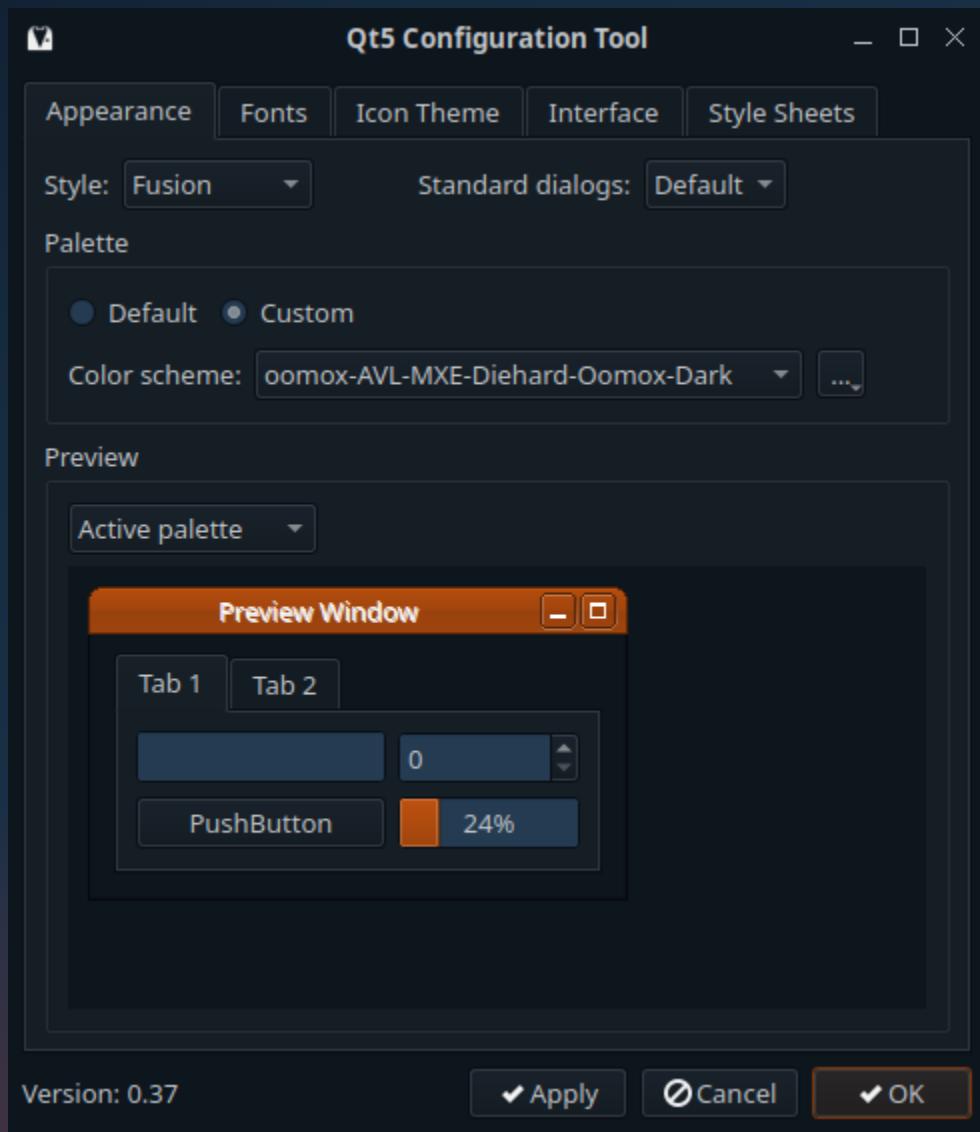
Right-clicking on a folder in Thunar will allow you to 'one-click' share it on your network. If you do share a folder on your network you may want to right-click on it and select a sharing or network 'Emblem' to display on the folder to visually remind you it is shared.



***PLEASE NOTE!!** - "Read and Write" will expose any folders you enable for sharing on your Network with permissions for ALL Users on your Network, if you are concerned about the security of your network, or are not sure which files you are making available DO NOT enable Samba sharing! It is also not recommended to share the root directory of a drive and all its contents on a Network.

QT5 Configuration Tool

When setting up the theme and appearance of your system it is important to note that the XFCE4 Settings for Themes and Icons only affect applications that use GTK2 or GTK3 UI toolkits for their graphical user interfaces. Some popular applications use QT for their GUI's and QT5 requires its settings to be done by a separate 'QT5 Configuration Tool' utility. You can open QT5 Settings either from the 'Settings' Menu or the 'Setup' tab of the AVL-MXE Assistant. In some cases it may take a few seconds for it to check your current QT5 configuration and launch. You can set your theme style, fonts, icons and other settings to make QT5 applications match your GTK system themes as closely as possible.



MX-Snapshot in AVL-MXE

With the 'MX-Snapshot' program found in the 'MX-Tools' of AVL-MXE you can create an ISO image of your system that you can boot with a USB key and run as a LiveISO or install to another computer. This powerful part of MX Linux is what makes AVL-MXE possible and in turn you can add or remove programs and make changes to your installed system and make a bootable ISO of your customized version of AVL-MXE. There are a few important items to be aware of before using MX-Snapshot in AVL-MXE:

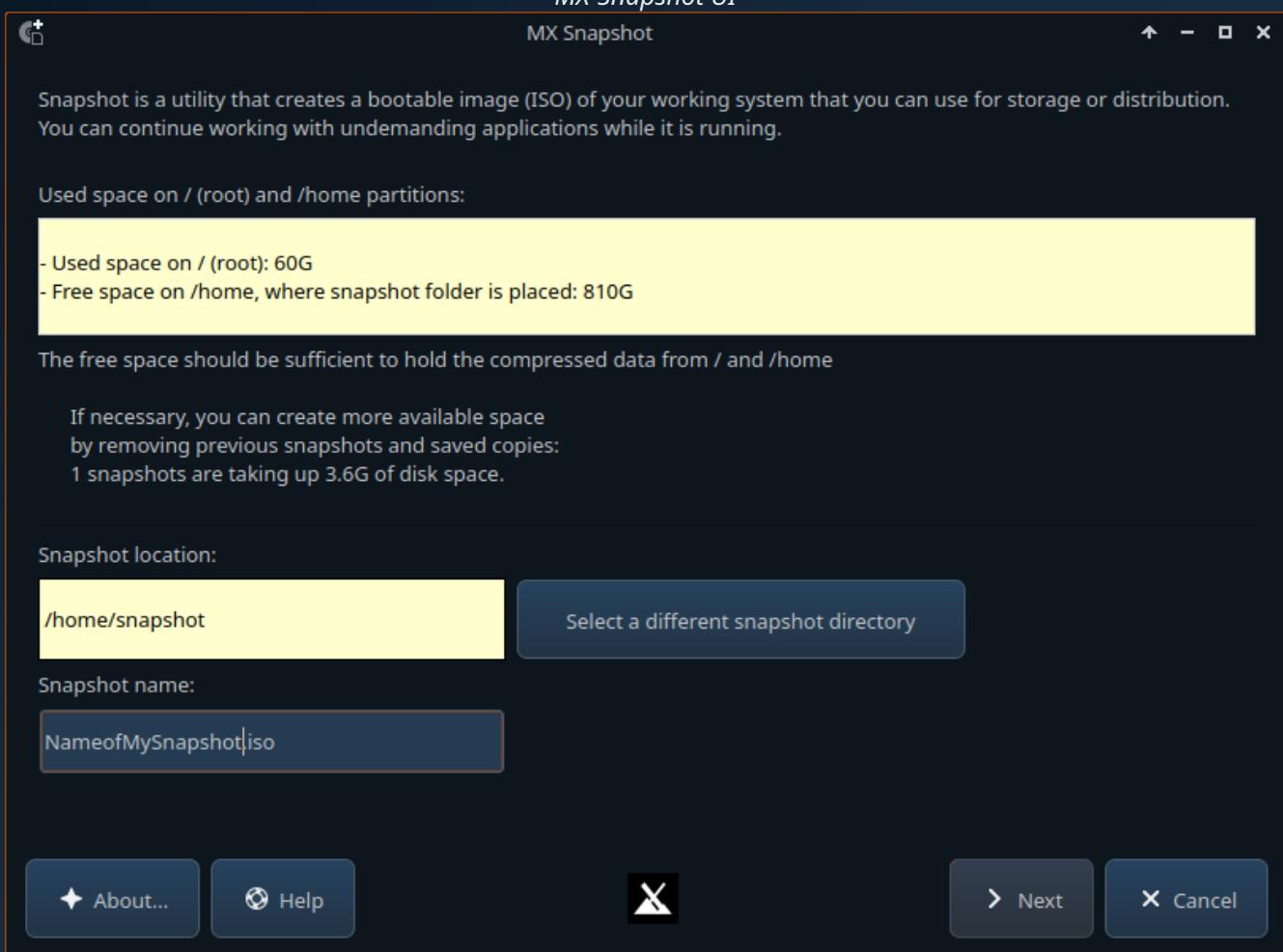
- I. If you are going to make a customized version of AVL-MXE to share with other people to download and use you must first remove the licensed Demo-versions of software using the AVL-MXE Assistant. These demos are specially licensed to be distributed in AVL-MXE only and you will be violating these licenses if you re-distribute them.
- II. If you are going to create and publicly share your own version of AVL-MXE with other people you must give it a different name and indicate that it is a different project derived from AVL-MXE to prevent confusion for potential Users.
- III. AVL-MXE features a special full-preempt RT Kernel and on very fast multiple core computers this Kernel may interact with MX-Snapshot in a way which requires it to be run differently on AVL-MXE than it is on MX Linux or a system with a regular or low-latency Kernel. This can potentially affect the proper generation of important md5 'checksum' files that are calculated to verify the integrity of core files that are a vital part of the ISO build. If this is an issue it will be evidenced by the md5 and SHA512 files that get created during the ISO building process having incorrect checksums or the ISO failing the md5 tests that can be run at Live boot by pressing F4 and selecting 'checkmd5' at the Live boot screen.

Normally you would simply launch MX-Snapshot from the MX Tools or the Whisker Menu but if we need to put MX-Snapshot into a special mode for it to work with the custom Kernel we need to launch it from a terminal with a special command that will launch it as Root and tell it to operate in 'preempt' mode.

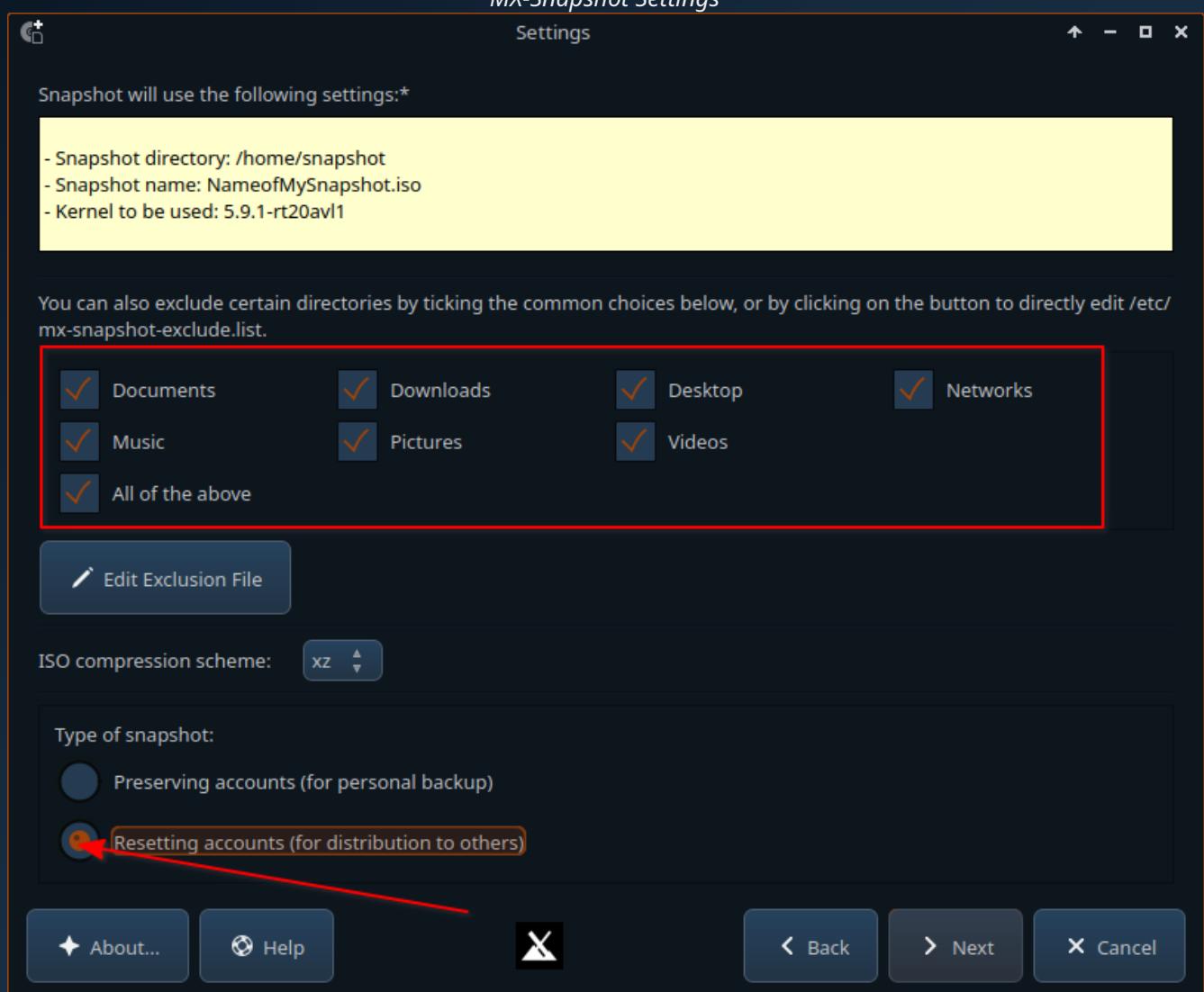
So in a regular Terminal enter this command:

```
mx-pkexec mx-snapshot --preempt
```

At this point you will be prompted for your Root Password and once entered it will open MX-Snapshot which will give you an option to choose where the ISO and related md5 and SHA512 files will be placed. The default is /home/snapshot/. You can also choose what you want the name for your custom ISO to be. With the '--preempt' switch MX-Snapshot will automatically run checks and determine if you have sufficient RAM to place the ISO build files in /tmp, if you do not have sufficient RAM MX-Snapshot will fall back to running in its default mode. Be aware that running MX-Snapshot in default mode with the RT Kernel may not generate correct md5 checksums and your ISO will potentially fail to boot so having sufficient RAM is a key element in successfully creating ISO files in the case of AVL-MXE specifically. MX Linux on its own or AVL-MXE with an optional non-RT Kernel installed will not have this constraint and will not require the '--preempt' command switch.



From here the MX-Snapshot options are as normal, you can select to create an ISO for your own use with your Data and Network configuration preserved or you can choose to make a more generic ISO without your Settings and Data that you can safely share with other people. By selecting the checkboxes for various items you can blend the choices for what you want to preserve from your setup and pass along what you want to exclude from your ISO. Advanced users can also exclude further items in the Filesystem but you should be cautious and familiar with what you are selecting for exclusion. You can also select the type of compression to use which will determine the size of your final ISO, 'xz' gives the most compression and therefore the smallest potential ISO size at the cost of slower performance on the Live booted system. Once you have made your choices click 'Next' to continue, confirm and create your ISO.

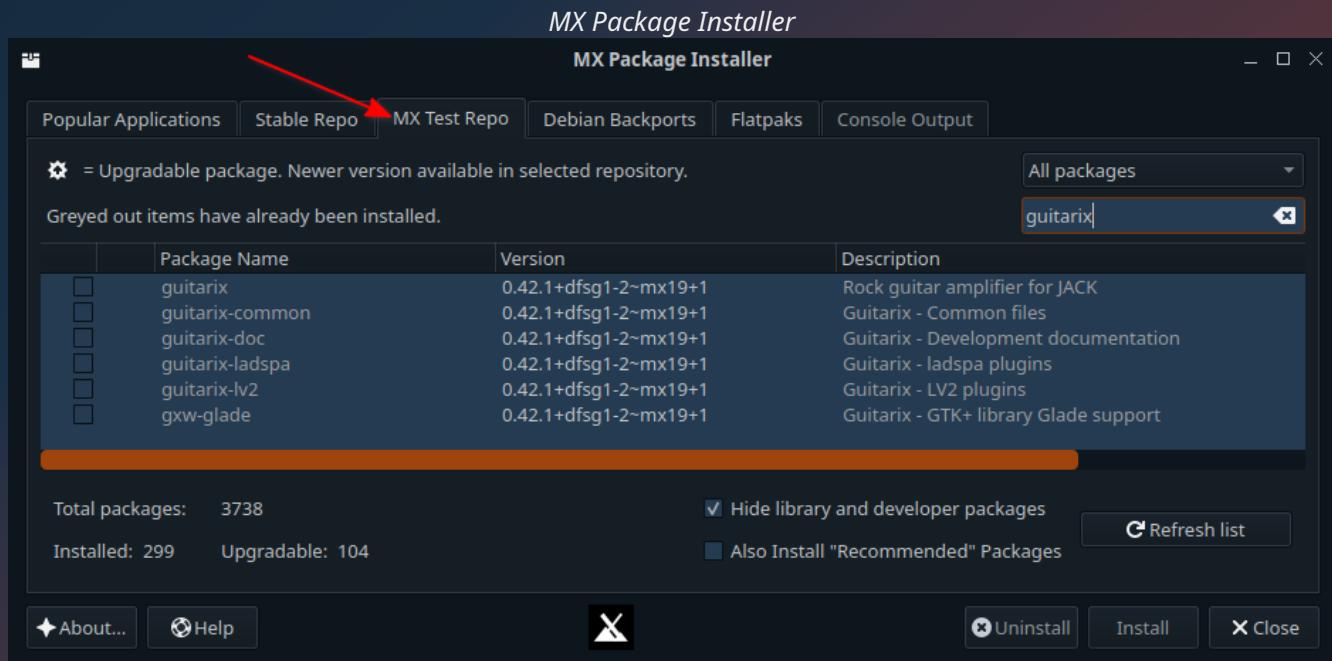


Software Installation Notes

MX Linux (and therefore AVL-MXE) is based on Debian Linux and makes use of its well-known APT/DPKG Package Management. There are some key software installation differences that should be noted between MX Linux and systems using Debian Linux directly. Most Debian Users are familiar with the graphical utility known as the 'Synaptic Package Manager' and AVL-MXE comes with Synaptic installed but it is not the sole method of adding and removing software from your system. MX Linux has its own powerful Package Manager known as the MX Package Installer (or 'MXPI'). It features a multi-tabbed interface that allows you to install applications from the default software Repositories (aka 'Repos') as you would on a normal Debian system but it has a few interesting extra optional features.

The MX developers have an incredibly dedicated team of their own 'Packagers' that fulfill a very important purpose of providing upstream software version upgrades that would not normally be available though the default Debian Linux Repositories. Because of the large amount of work that they do in response to User requests MX Linux has an extra 'Testing' Repo that provides an optional staging area for Users to try out upgraded applications before they enter the default MX Repo. It is NOT advised to have this Repo enabled for use at all times so the 'Testing' tab of MXPI allows you to temporarily enable the Testing Repo and install software from it. For this reason it is discouraged to install Testing packages with Synaptic.

In addition MXPI provides the option to temporarily enable 'backported' Package Repos from Debian Linux and a great extra feature is the ability to install self-contained 'Flatpak' applications on the system as well. If you want to play it safe you can simply choose not use these extended features and only install Software Packages from the default Repos provided in AVL-MXE.



Audio and MIDI in AVL-MXE

Recommended Reading!

PulseAudio with JACK :

It cannot be overstated that AVL-MXE has the potential to differ *significantly* from your usual Linux Desktop in its handling of Audio routing and subsystems. AVL-MXE relies on the low-latency Jack Audio Connection Kit (a.k.a JACK) for its powerful interconnectivity. JACK is a low-latency sound server which runs on top of ALSA (Advanced Linux Sound Architecture). ALSA is the basic 'driver' level of Audio hardware support and is both integrated in the Kernel itself as well as being a core component of the Operating System. By default many distributions and Desktop Environments install the 'PulseAudio' Audio server, in recent years PulseAudio can be made to peacefully coexist with JACK and AVL-MXE makes this easier by pre-configuring JACK and PulseAudio to work together with a custom 'pajackconnect' script .

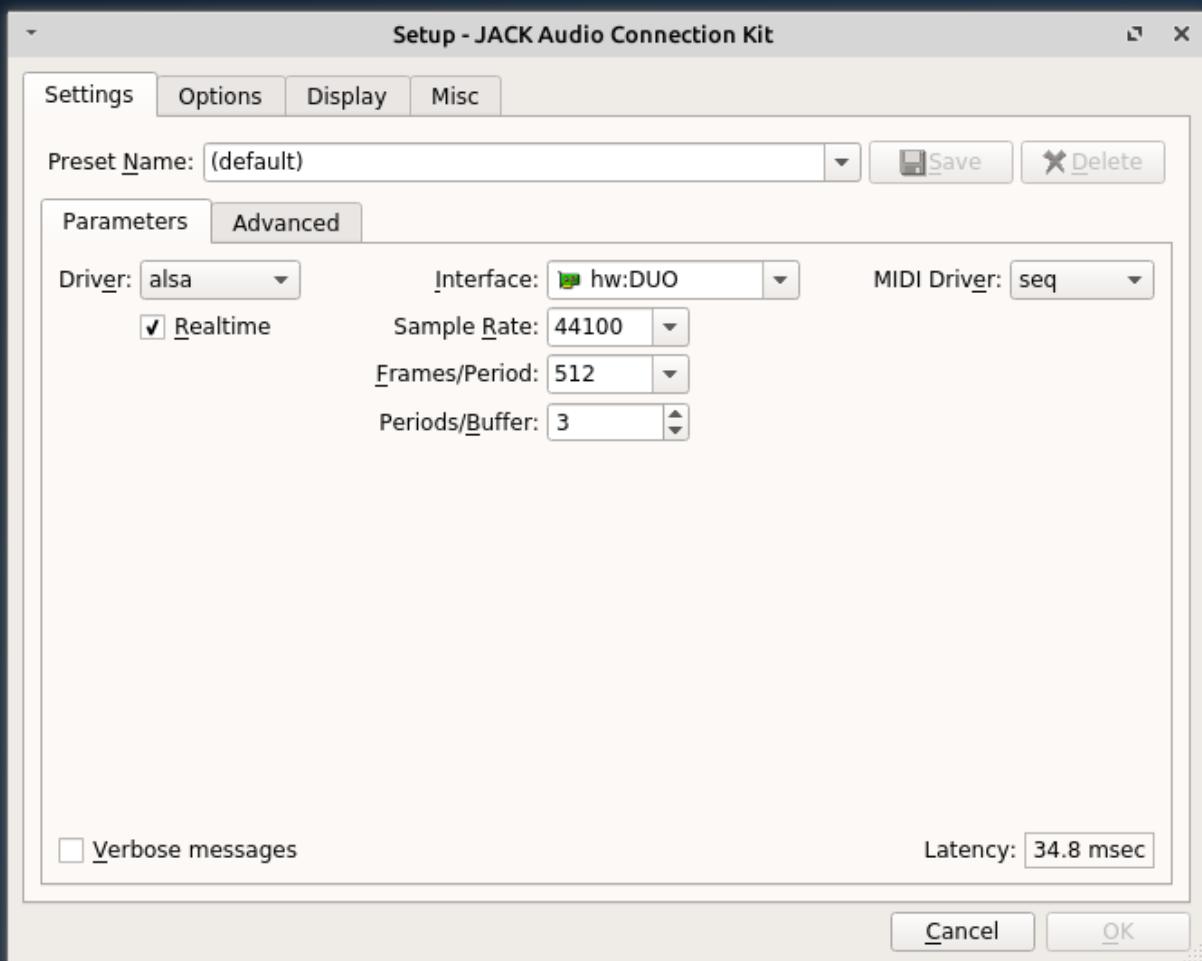
Setting things up with Qjackctl :

The most initially confusing thing for many people getting started with Linux Audio is how to get the applications they want to use to 'see' (or perhaps hear) their Audio device. Reading this section will hopefully facilitate getting everything to 'just work'. The biggest step required of the User is to *identify* and *select* the Audio device they want to use, after that most of the complexity is looked after for you.

The easiest way to setup the JACK Audio server is to use the JACK Control app (a.k.a. Qjackctl). It can easily be launched from the XFCE4 Panel or Whisker Menu. To setup your Audio device click the 'Setup' button.



The 'Setup' Window has multiple tabs which we will go over one at a time, the 'Settings' tab is where we initially select and set up the device we want to use with JACK in the 'Parameters' tab. To the left is the 'Driver' select dropdown box. Internal, PCI, and USB 1.1 and 2.0 Audio devices require the 'alsa' driver and FireWire devices require you to select the 'alsa' or 'firewire' driver (depending on the firewire driver being used). It is essential that the 'Realtime' checkbox is selected. Next we need to select our desired Audio device from the 'Interface' dropdown box.

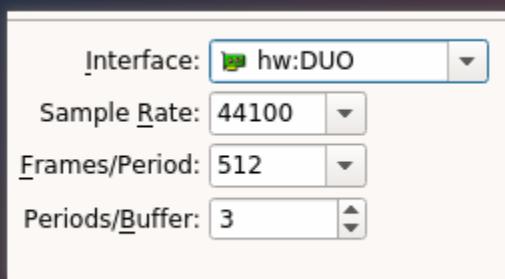


In the 'Interface' dropdown box we will see a list of available Audio devices on the system, generally speaking whatever appears in the dropdown box should be supported to use with JACK, below is an example with multiple ALSA devices on a system to illustrate what to look for.



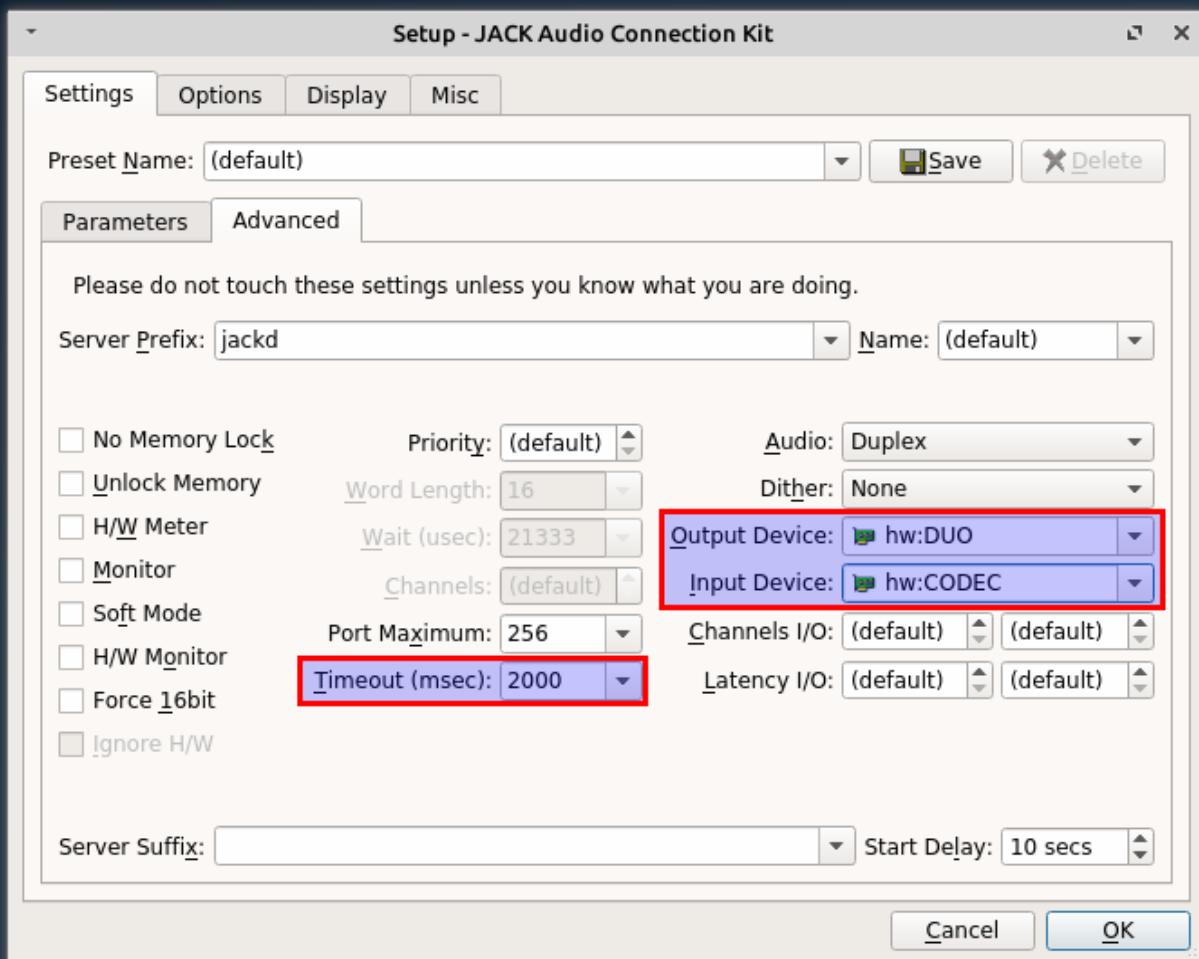
In the example picture above we can see that the system has a 'USB Audio CODEC' device at 'hw:0' and an iRig DUO USB Audio device at 'hw:1'

Underneath the 'Interface' dropdown box we can set the 'Sample Rate' , 'Frames/Period' and 'Periods/Buffer'. By default AVL-MXE is pre-configured for a Sample Rate of 44100, 1024 Frames/Period and 3 Periods/Buffer. Potentially these default settings will work OOTB for most Users but may need to be changed depending on the performance of your hardware. The most influential number is 'Frames/Period'. If you are experiencing Audio dropouts or 'Xruns' you may need to increase from '1024', conversely if you want to have lower 'latency' you can decrease from '1024' until Xruns reappear. The 'Periods/Buffer' figure is dependent on the Audio device type, USB and Internal Audio devices generally perform best at a setting of '3' Buffers and PCI(e) Audio devices require a setting of '2'. Once you are happy with your settings you can start JACK by hitting the 'Start' button on Qjackctl.



***PLEASE NOTE!** - 'Latency' is the delay incurred by your Audio/MIDI signals going into your Audio/MIDI device Inputs and following the signal path of both the hardware and software Applications being used and coming back out of the Audio/MIDI device's Outputs.

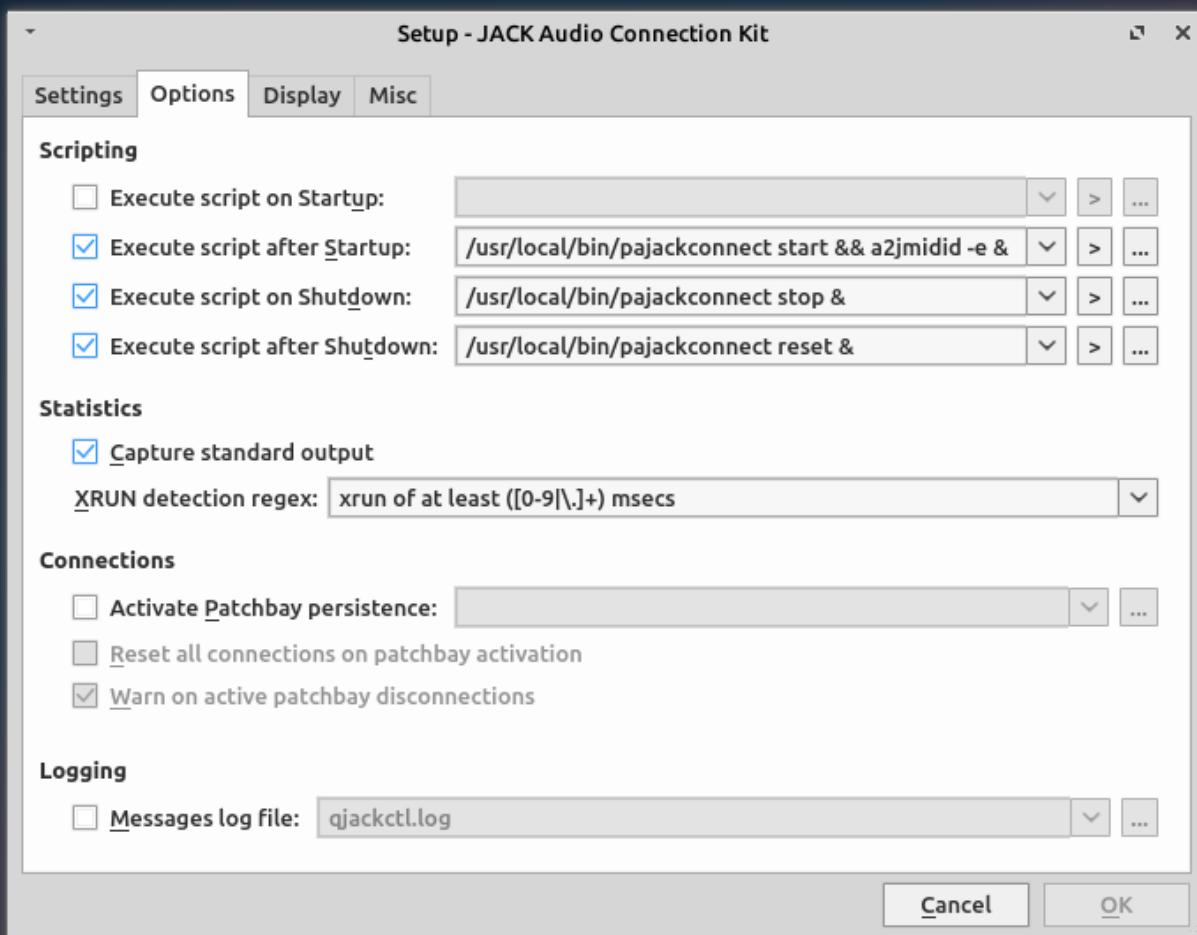
The 'Advanced' tab of the Setup window contains extra settings for experienced Users and in most cases these settings do not need to be changed. The ability to choose separate Output and Input devices may be of interest to people who want to use multiple Audio devices, a common scenario is using USB microphones to record and another System Audio device to play back. Another important JACK setting is the 'Timeout' value for running MIDI Plugins and editing a setting of 2000ms is recommended and set by default.



JACK's L'il Helpers: pajackconnect and a2jmidid :

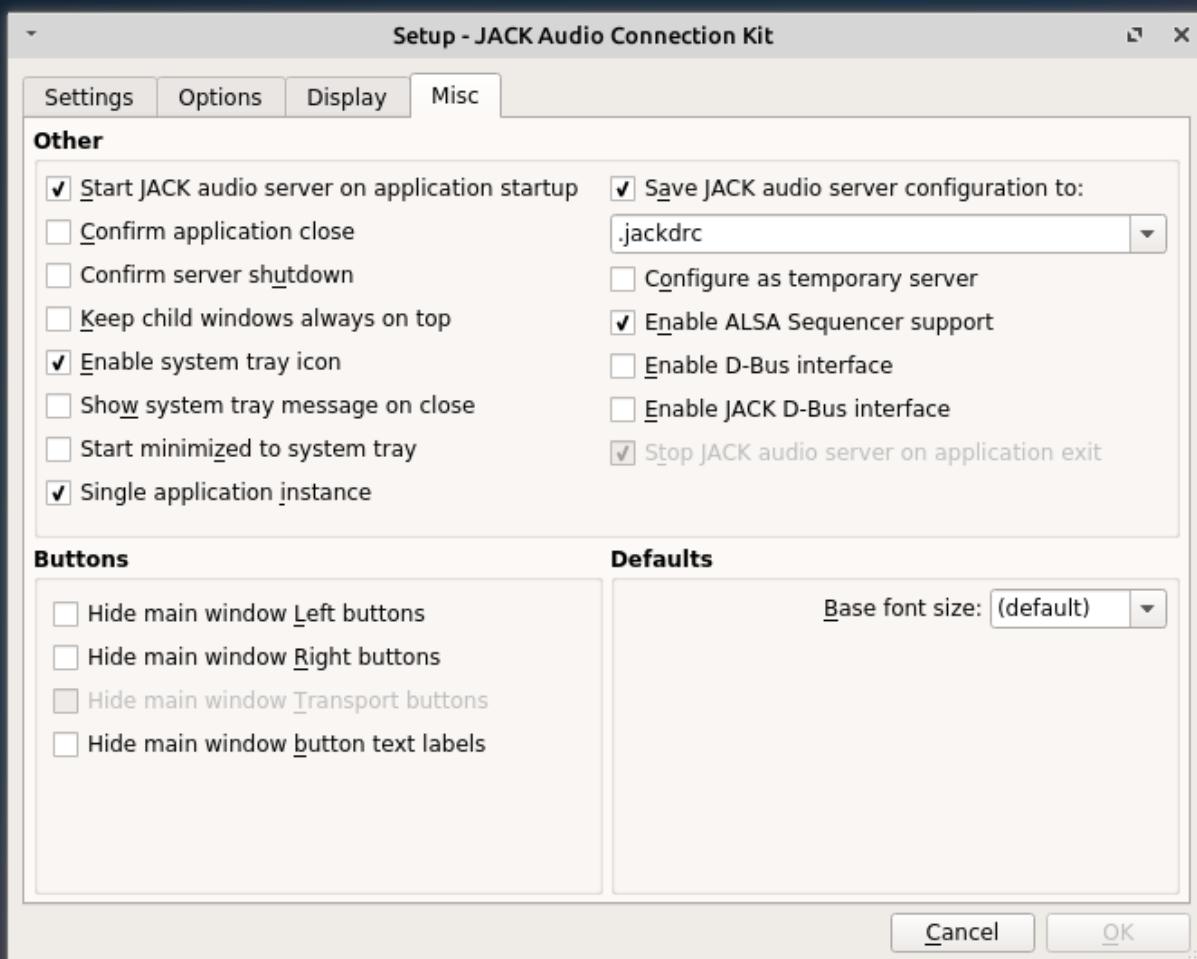
The next 'Options' tab is where we can have Qjackctl execute any optional scripts when it is started, by default AVL-MXE provides a '*pajackconnect*' script as one of two very important helper applications when Qjackctl starts JACK. One helper application is '*a2jmidid*' (ALSA to JACK MIDI Daemon). In Linux there are 2 methods of handling MIDI I/O, one is at the ALSA driver level and the other is with JACK. This can be a problem if you are using an application with JACK and trying to connect a MIDI device with ALSA, the two methods cannot be used at the same time so the solution is to bridge any ALSA MIDI devices so they appear available as JACK MIDI and this is exactly what '*a2jmidid*' is for, now any ALSA MIDI devices seamlessly appear to be selected as '*a2j*' in Applications using JACK.

The second helper application is a script known as '*pajackconnect*' and its purpose is to integrate PulseAudio as a *source* and *sink* server and client routed through JACK. This ensures that applications using PulseAudio will route their Audio to the selected running Audio device you've selected in Qjackctl.



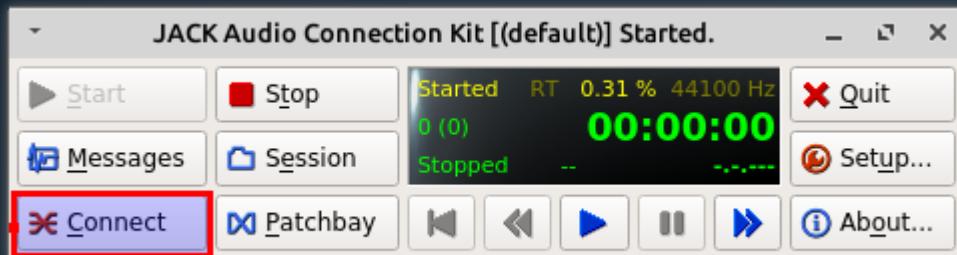
JACK Autostart and Other Settings :

The 'Misc' tab of the Qjackctl 'Setup' window gives some other convenient options for getting JACK integrated smoothly. The '*Start JACK Audio server on application startup*' checkbox means as soon as you launch Qjackctl it will start JACK without you needing to hit the 'Start' button. You can also have Qjackctl run in the system tray on the XFCE4 panel when you close the GUI. If you have a setup where you are using one Audio device and it doesn't change you can have Qjackctl automatically start when you log in to your computer, for this to work you need to select the option to '*Start JACK Audio server on application startup*'. To have Qjackctl automatically start you need to add it to the XFCE4 'Session and Startup' list. Go to the Whisker Menu and type '*Session*' into the search bar and the top choice should be '*Session and Startup*', go to the 'Application Autostart' tab and click the 'Add' button and create an entry for Qjackctl like the one shown on the next page.

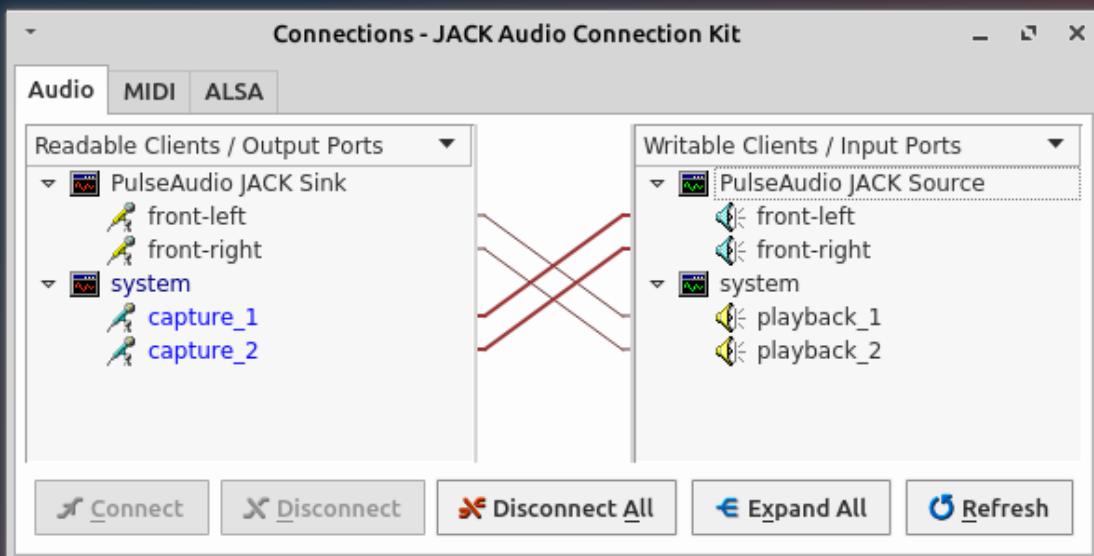


Getting Connected :

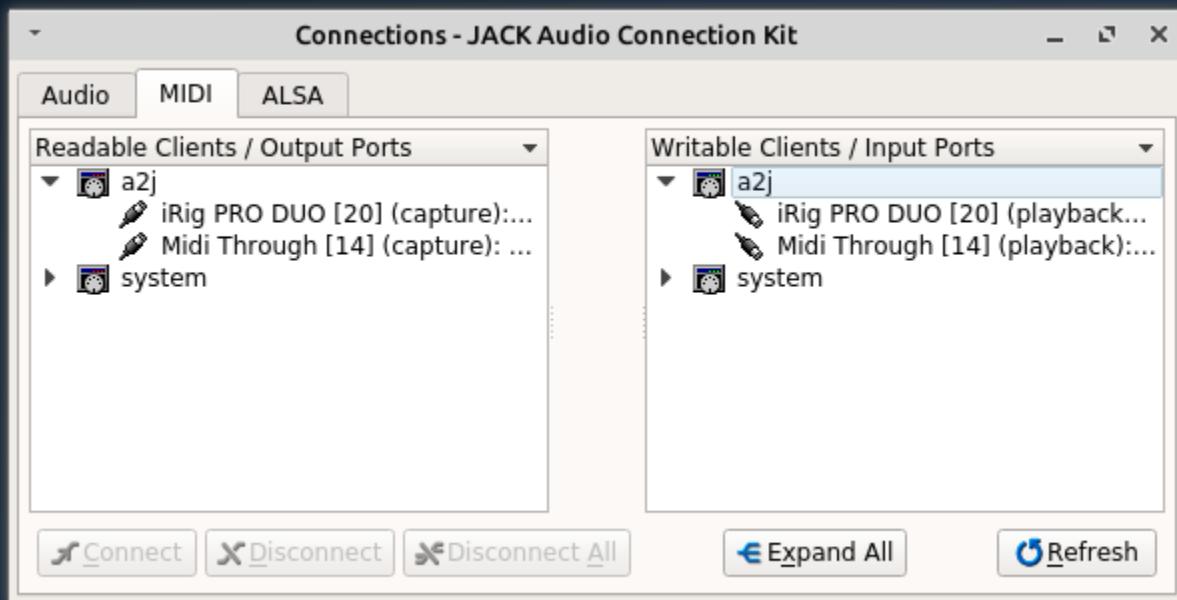
If you are using a monolithic DAW like Ardour or Mixbus with JACK you will find that most of the connectivity you need is managed within the program itself so making manual connections is not necessary, in these cases you simply start JACK and then launch your program. However if you want to use and connect individual JACK-aware programs you may want to use the connection features of Qjackctl. To access the connections window click the 'Connect' button.



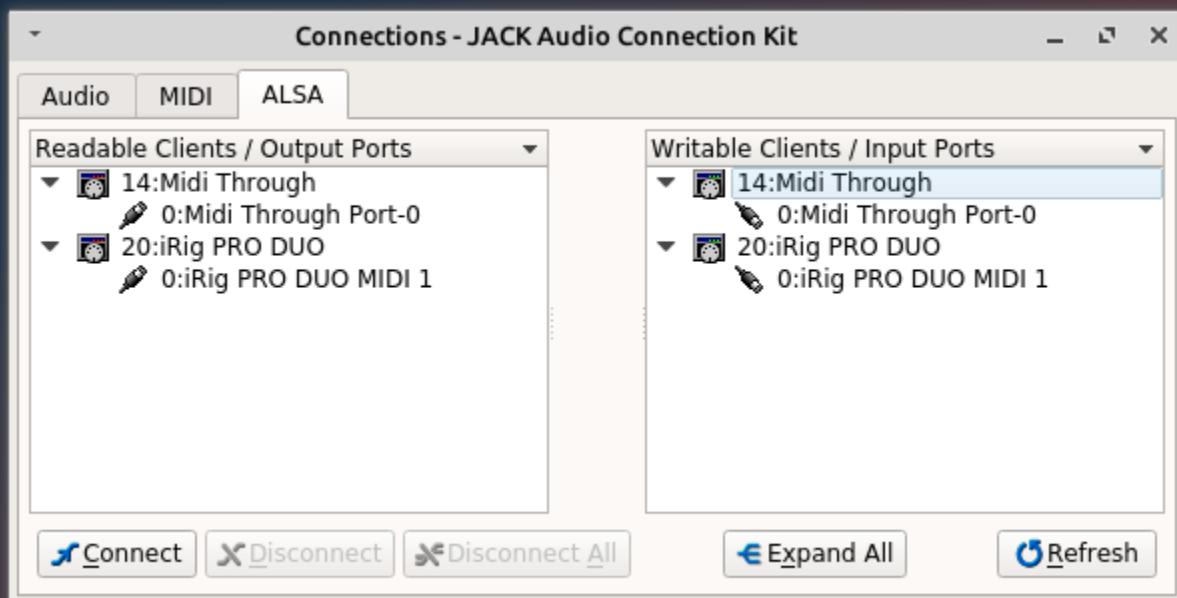
There are three tabs in the 'Connections' window which pertain to three specific connection points. 'Audio' is for both hardware and software Audio (not MIDI) connections. When you are using the default AVL-MXE settings it is normal and expected for the 'PulseAudio JACK Sink' and 'PulseAudio JACK Source' clients to appear because PulseAudio is still active on the system. If you have a JACK-aware application running it should appear in the 'Readable or Writable Clients' panes and in most cases you will want to connect it to the 'system' playback or 'system' capture ports *not* the PulseAudio ports.



The center 'MIDI' tab is for 'JACK MIDI' connections, because JACK MIDI is being bridged by 'a2jmidid' its ports appear under the 'a2j' Client. You can see the iRig PRO DUO is visible in this tab ready to be connected to JACK-aware MIDI applications.

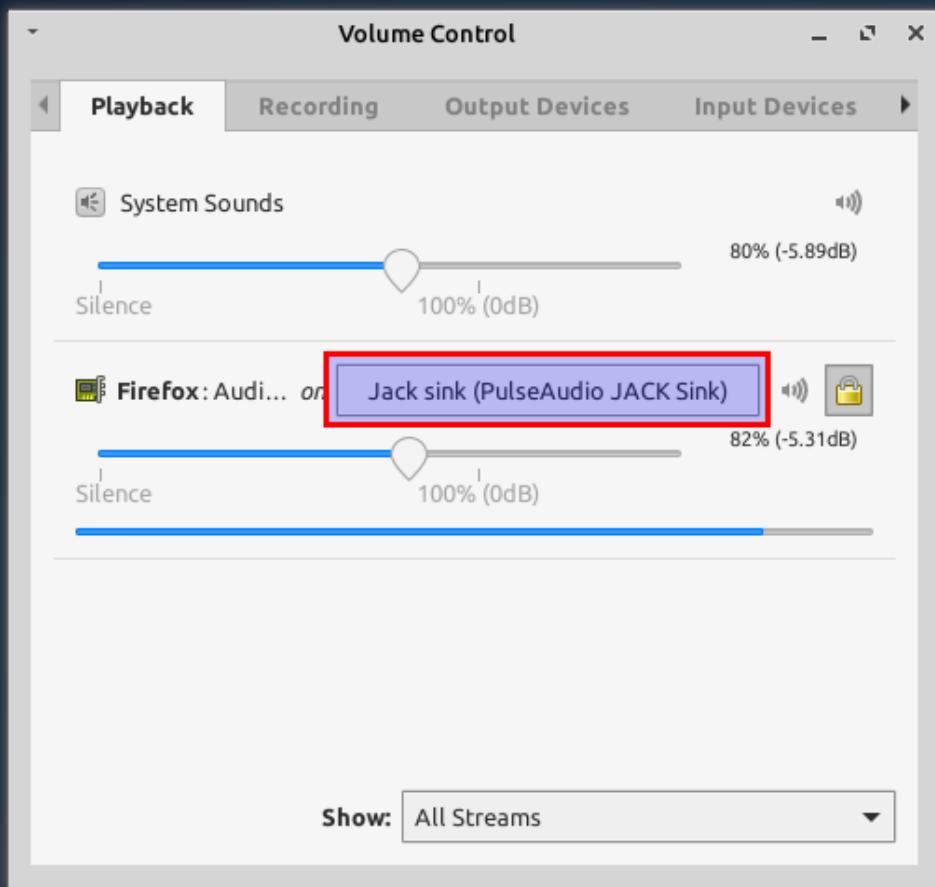


The 'ALSA' tab is for ALSA MIDI hardware and software to be connected, as you can see since the iRig PRO DUO is supported by ALSA it also appears in the ALSA tab.

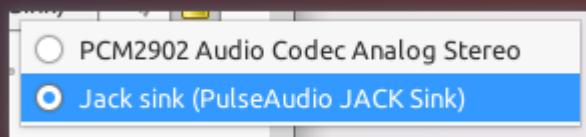


Potential Audio Routing Problems with Mozilla Firefox :

Recently Mozilla's Firefox Web Browser changed its Audio routing from directly connecting to ALSA to utilizing PulseAudio. It has been noted that if PulseAudio and JACK are working together utilizing the 'PulseAudio JACK Source/Sink' Firefox may try to access the default system Audio device directly rather than connecting through the already running PulseAudio JACK Sink. This results in no Browser sound and Audio and Video streams that will not play back. To fix this Firefox needs to be directed to use the JACK Sink by using the PulseAudio Volume Control launched either from Menu→ Multimedia→PulseAudio Volume Comtrol or clicking the PulseAudio applet on the XFCE4 Panel. Look for 'Firefox' in the 'Playback' Tab and click on the highlighted Audio device button.



Make sure you have the 'PulseAudio JACK Sink' selected for Playback rather than the system Audio device.

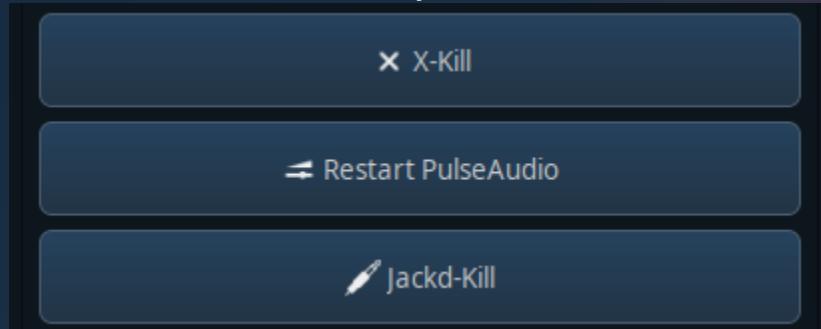


jackd and jackdbus :

There are 2 different ways the system can run JACK behind the scenes, the simplest is by running the 'jackd' executable with 'Qjackctl' and this is what AVL-MXE uses by default, however there is a second way of running JACK and this is with the Desktop interprocess communication mechanism known as 'D-bus'. Running JACK with D-bus is a selectable option in Qjackctl (Setup → Misc. tab). If you start JACK with Qjackctl before doing Audio and MIDI work you will probably not encounter the D-bus JACK executable known as 'jackdbus'.

Occasionally other JACK-aware programs that are launched before Qjackctl may inadvertently start jackdbus and when you later try to launch JACK with Qjackctl you will see JACK is already running and displaying as 'Active' in the Qjackctl GUI and you may even notice that the sample rate may set to a different value than intended. Only one instance of JACK can run at a time so you may not be able to launch other JACK-aware programs or you may find that your Audio setup seems to have a mind of its own if jackdbus is running undetected in the background.

The 'AVL-MXE Assistant' has utilities to help shutdown hung or misbehaving programs and also to kill any instances of jackd and jackdbus running in the background and reset the system to start JACK cleanly.

X-Kill and Jackd-Kill:

You can also manually kill all JACK processes by running this command in a regular Terminal:

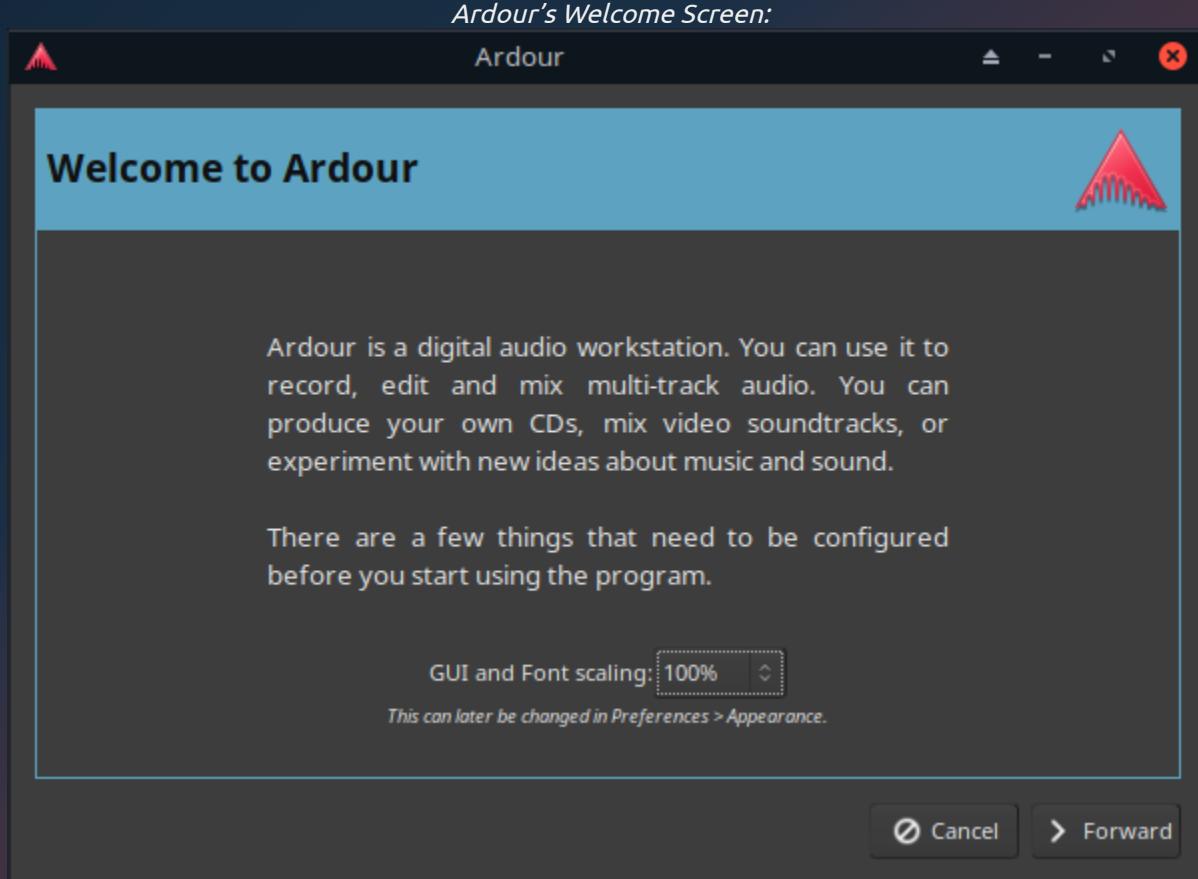
```
killall -9 jackd jackdbus
```

Initial Setup of Ardour and Mixbus 32C

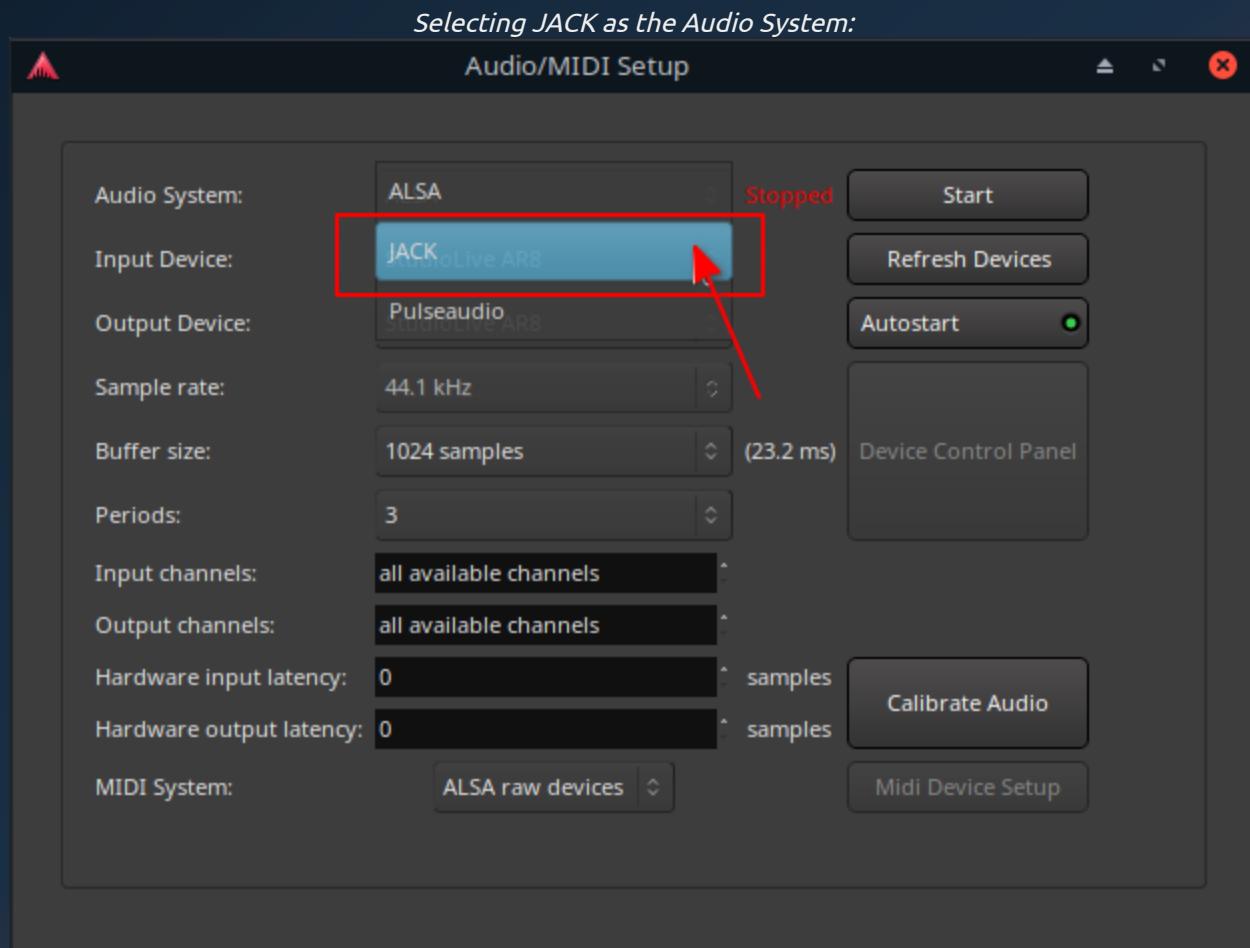
Choosing An Audio Backend :

For many people new to Audio Recording with Linux it can be a bit confusing and daunting to initially set up the full-featured DAWs Ardour and Mixbus. Both powerful programs share the same core so we will use Ardour as an example. Recently Ardour and Mixbus have gained the ability to be used with either JACK, ALSA and most recently PulseAudio 'backends'. If you don't wish to use Ardour or Mixbus with JACK then choose one of the other Audio backends and ignore the JACK specific instructions in this section. As stated in the previous chapter AVL-MXE is centered around using the JACK Audio server, because JACK has interconnectivity with other external JACK-aware programs it is recommended to prefer the JACK backend for using Ardour/Mixbus and to have JACK up and running before Ardour and Mixbus are launched.

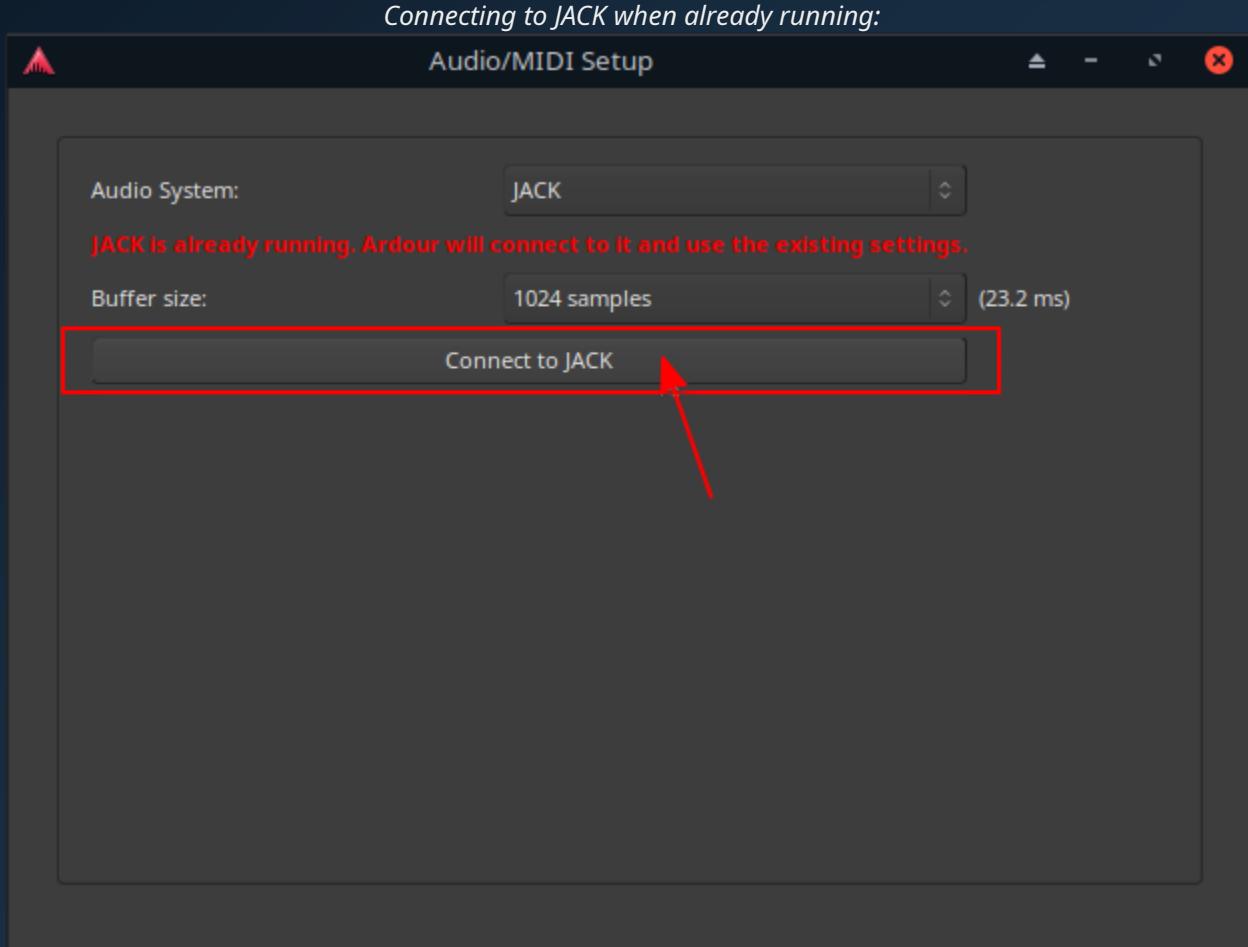
When you initially launch Ardour or Mixbus either in a Live Session or a fresh HDD install you will be greeted by an initial welcome screen and walked through a few setup dialogs, in most cases except for what is detailed here you can accept the default setup choices as offered.



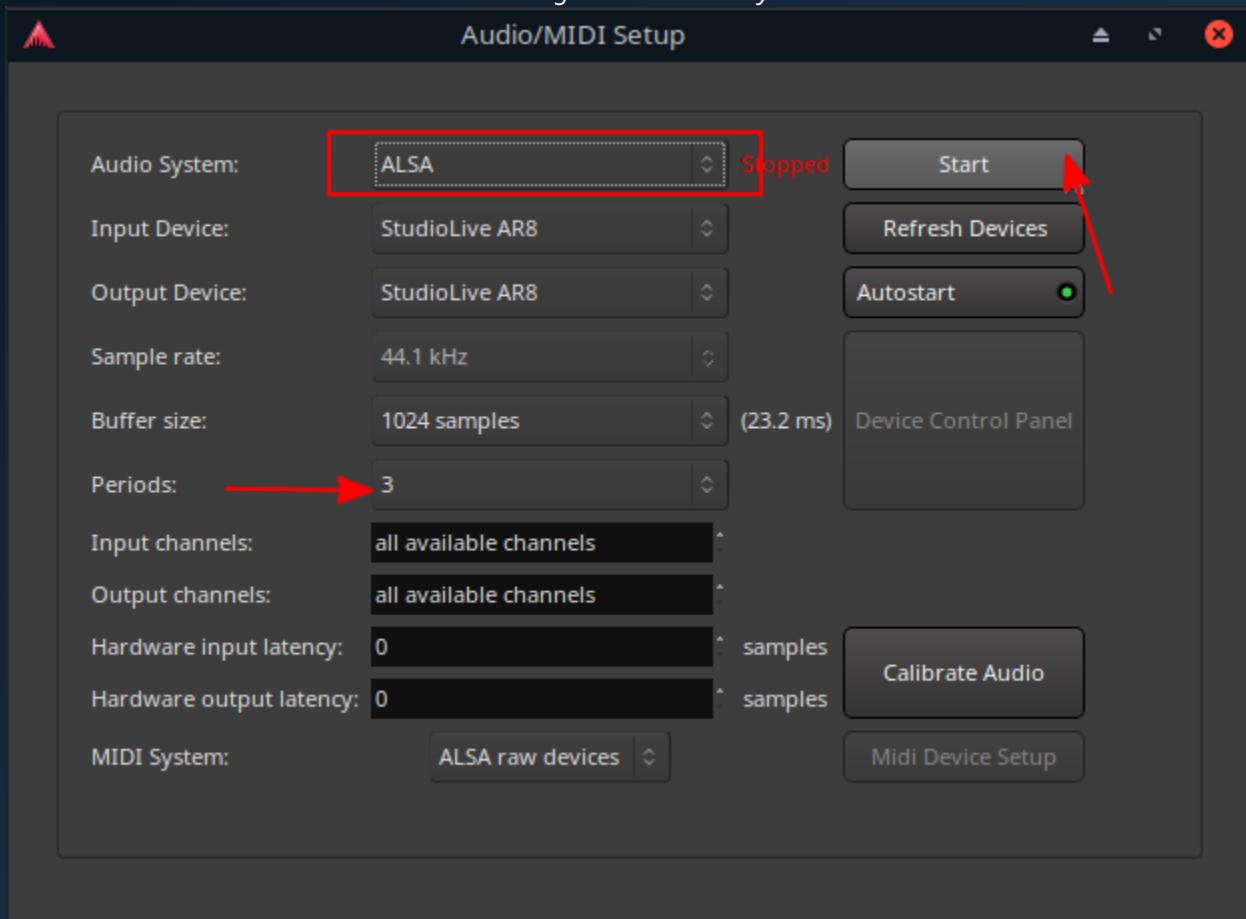
When you set up your initial Ardour/Mixbus session you will be presented with an 'Audio/MIDI Setup' dialog, this is where you will choose whichever Audio backend you will use. As stated JACK is the *preferred* recommendation, ALSA can be selected but has the following caveat: No Audio/MIDI from any other external programs or applications can be routed in or out of Ardour/Mixbus. In the ALSA setup example below we are using the same USB Audio device for both Input and Output which is a suggested practice. It is possible to select a different Input than the Output, people using USB Microphones may want to use the mic with an Input and the System Audio device as an Output. Take note that since this is a USB Audio device we set the 'Periods' dropdown selection to '3', for internal or PCI(e) Audio devices it is recommended to use a setting of '2'. If required it is also possible (but not usually necessary) to accurately calibrate Audio/MIDI latency using a cable looped from your Audio/MIDI outputs to the inputs to calculate the actual latencies. Once you have your settings selected click the 'Start' button to your upper-right.



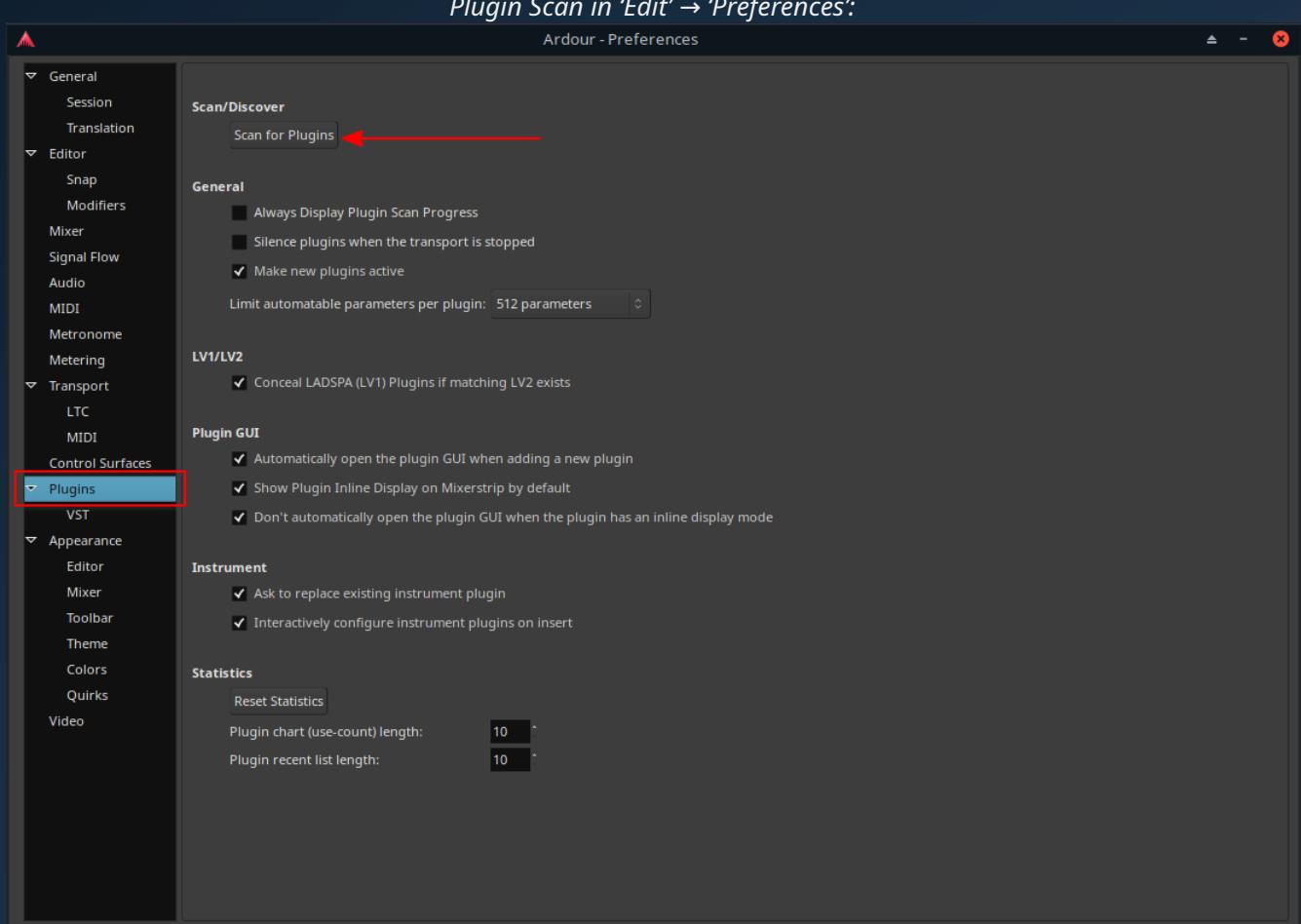
If you already have JACK up and running before setting up your initial Ardour/Mixbus session when you select the 'JACK' backend it will detect that JACK is already running and simply clicking the 'Connect to JACK' button will connect you to whatever settings and Audio device you've chosen in Qjackctl.



Connecting to ALSA Audio System:



A very important part of the initial setup process is to have Ardour scan for Audio plugins, the scan will ensure that the hundreds of pre-installed Audio Plugins included in AVL-MXE will all be present and ready to use in your Ardour sessions. Ardour will auto-detect LADSPA and LV2 Audio plugins, LinuxVST plugins specifically will be found during the scan. It is important to note that any LinuxVST plugins you may have added yourself that aren't located in the standard paths of /usr/local/lib/vst or /usr/lib/vst will require you to point Ardour/Mixbus to their folders by adding a custom path after launching the program, custom paths are set in 'Edit' → 'Preferences' → 'Plugins'.

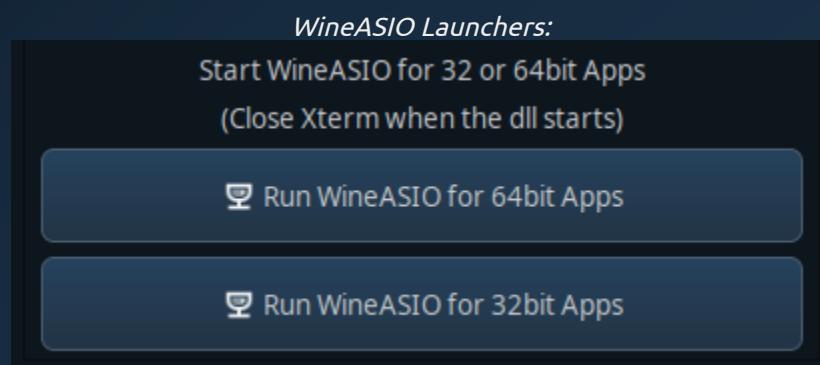


Further Info: [The Ardour Reference Manual](#)

Running Windows Audio Software

Exposing Windows ASIO Audio drivers to JACK with WineASIO :

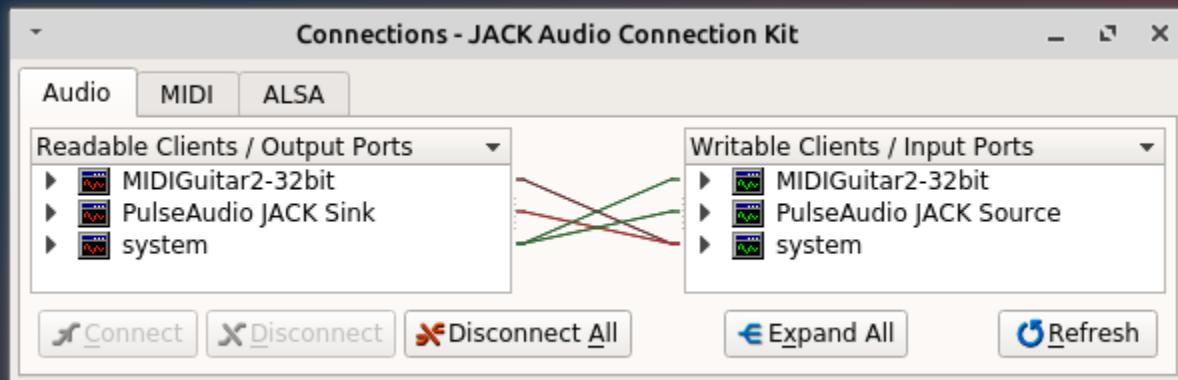
It is possible to run some popular Windows Audio software in AVL-MXE and have it run with Windows native ASIO Audio drivers. This is accomplished using a utility called WineASIO which runs in the Microsoft Windows emulating Linux software known as 'Wine'. AVL-MXE 2020 comes with 'Wine-staging' installed and a WineASIO launching utility that can be found in the 'Wine/LinVST' Tab of the AVL-MXE Assistant. To use WineASIO you must first have the JACK Audio server running as detailed in the '[Audio & Midi in AVL-MXE](#)' section. WineASIO can be used with both 32bit and 64bit Windows software applications.



Once you select the appropriate button pertaining to the Windows Audio application you want to run a Terminal window will open confirming that the WineASIO '.dll' has successfully launched. The terminal window output will be very verbose with several warnings specific to Wine-Staging. The main thing to watch for is that the DLL has launched successfully so look for this line at the bottom of the Terminal:

```
regsvr32: Successfully registered DLL 'wineasio.dll'
```

When WineASIO is up and running you can launch your Windows program and select the WineASIO driver in the Audio setup dialog of the application. As an example we will use the standalone version of the Windows software 'Jam Origin MIDI Guitar 2'. As you can see in the highlighted section the WineASIO driver has been selected which will route the Audio output through JACK.



Running Windows VST Plugins in Ardour/Mixbus :

Steinberg's 'Virtual Studio Technology' or 'VST' Audio plugin format is a cross-platform industry standard and there are a wealth of good quality commercial and free VST plugins available. VST's for Windows are by far the most common and a large number of them will run on Linux with the aid of 'wine' Windows emulating software and various bridging applications. As you would expect running Audio plugins that are not native to Linux presents challenges and *it can not be overstated that there are no guarantees of functionality and stability, it is always preferable to run Audio plugins that were intended for the Linux platform.*

AVL-MXE comes with a small set of 'oldie-but-goodie' free 32bit Windows VST Audio plugins placed in the '/usr/local/lib/vst' folder of the filesystem. With 'wine-staging' and 'LinVST' pre-installed these plugins are ready to be hosted and used in Ardour and Mixbus32!

Hosting Windows VST's with 'LinVST' :

The AVL-MXE method of hosting Windows VST plugins is the use of the 'LinVST' bridge, LinVST works by wrapping the Windows '.dll' filetype and making it appear to the plugin host as a native Linux VST '.so' file. The included Windows VST plugins in AVL-MXE already have been converted, follow the instructions below for any new Windows VST's you may add.

In AVL-MXE Windows VST's are placed in /usr/local/lib/vst and /usr/lib/vst is for native for Linux VST's only... The rationale for this is that most DAWs will look along both of those paths automatically for VST plugins of any kind and we want VST's to be available system-wide for all Users not buried in the .wine folder in the Users home folder. One of the files pre-installed by LinVST is a dummy file called 'linvst.so' which is used as a test reference to convert all your Windows VST '.dll' files to Linux-friendly '.so' files. It is the '.so' files which LinVST will make appear in the usual list of plugins in Ardour/Mixbus.

LinVST comes with a little graphical utility to find the linuxvst.so file and then find all your .dll files and do the conversion, linuxvst.so is installed to /usr/share/LinVst/64bit-32bit/. Once you are certain that linuxvst.so is in the correct spot then you can run the conversion utility from the "Wine/LinVST" Tab of the AVL-MXE Assistant, if you have kept everything in /usr/local/lib/vst then you will want to use the Root option because that folder is outside the User's home folder in the filesystem, if you have everything together in a different VST folder in '.wine' or elsewhere in your home folder then you can use the regular LinVST option. 'Basic Mode' is for single VST .dll files on their own, 'Tree Mode' is for VST Plugins in subfolders, if in doubt use 'Tree Mode'.

LinVST Utilities:

Set up LinVST as Current User

*linvst.so is located in /usr/share/LinVst

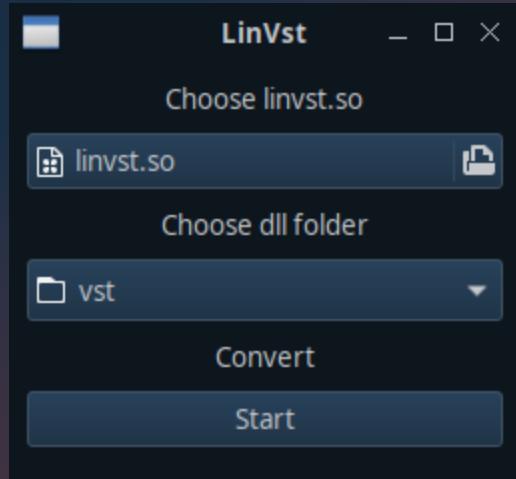
 Set up LinVST

Set up LinVST as Root

*linvst.so is located in /usr/share/LinVst

 Set up LinVST (As Root)

This will open a little dialog that prompts you to find 'linvst.so' (find it in /usr/share/LinVst/64bit-32bit/) and then find where your Windows VST .dlls are, once that is done hit 'Start' and it will convert the dlls to so's.



Now open Ardour/Mixbus and go to Edit--->Preferences--->Plugins--->VST and make sure the path to your Windows VST folder is there (this is why I use /usr/local/lib/vst because Mixbus looks there automatically). If your particular path isn't there you'll need to add it manually so Ardour/Mixbus knows where to scan.. Once that is done run a plugin scan and if all goes well those converted '.so' files should be picked up and appear as selectable in the Ardour/Mixbus plugin list. The image below shows the 'Slick EQ' Windows VST Plugin running with LinVST in Ardour.



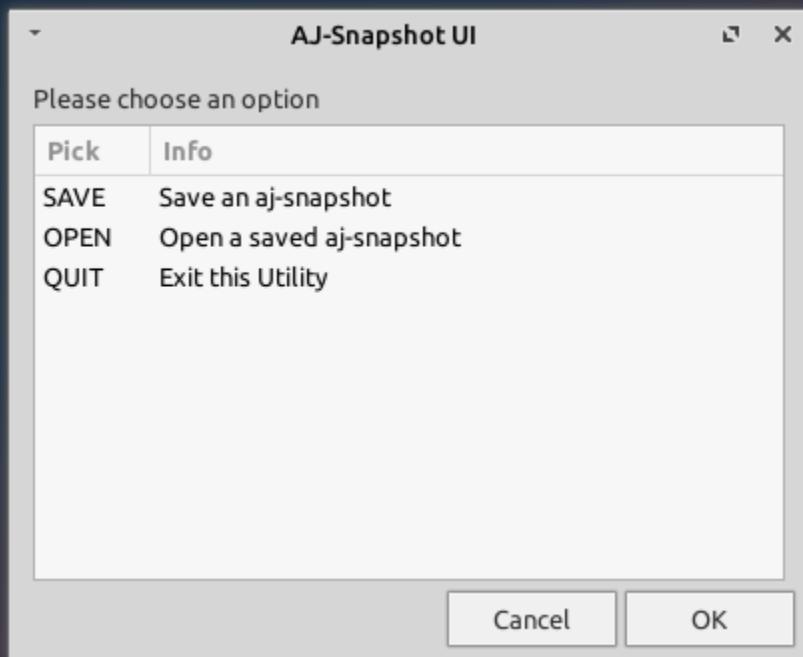
PLEASE NOTE The first time Wine-Staging runs on your computer it needs to configure itself and set up its directories in a hidden '.wine' directory in your User home folder. Wine-Staging does not run its setup until the first time it is called to run a Windows program by the host system. If the first time Wine is initiated is during a plugin scan within a DAW it is possible the initial Wine configuration setup will occur as you are running the LinVST plugin scanner which ensure the renamed '.so' files of the Windows VST Plugins show up in your Linux DAW. On some systems this may cause the scan to time out, fail and not completely finish. Once Wine has set up its initial config you should be able to run the plugin scan again in your DAW and it should be able to successfully complete.

Saving and Restoring JACK Connections

AJ-Snapshot for JACK-Aware External Application Connections :

If you are using several JACK-Aware applications and connecting them together those unique individual JACK connections will be lost when you shut down the individual applications. This is a much different scenario than when you are working within a DAW like Ardour, in that case the DAW remembers the connections when you save your session. What if you want to use external JACK programs in various combinations with a complicated routing? You certainly don't want to have to remember and manually re-connect every time you use those uniquely arranged programs.

A very simple and effective tool to save and restore ALSA and JACK Routing is a little CLI utility called aj-snapshot. In AVL-MXE I have added a very simple UI to make using aj-snapshot a little easier. With JACK running and your applications connected simply launch 'AJ-Snapshot-UI' from the Whisker Menu, it can be found in Multimedia → AJ-Snapshot-UI. Select the option to 'Save an aj-snapshot' and it will prompt you to enter the name of the snapshot and present a File Manager to save it where you want. Later, with JACK running and the applications you wish to re-connect launched and running simply open your saved Snapshot and the routing and connections will be restored.



Commercial Software Demos in AVL-MXE

An Introduction to Some New Options :

AVL-MXE is somewhat unique compared to its contemporaries in that it offers the choice of trying Commercial software demos within the base Operating System. Over the years good relationships with Vendors have been formed and have provided the opportunity to showcase both Open-Source excellence and innovative Commercial Audio choices. Currently AVL-MXE provides the Demo version of **Harrison Mixbus 32C** which brings the authentic sound of the famous Harrison hardware consoles into a powerful DAW based on Ardour. Harrison Mixbus 32C also comes with all of Harrison's Audio Plugin Demos (both XT and AVA) for you to evaluate as well. Brand new for the first release of AVL-MXE is the addition of the very popular **Reaper** DAW. Reaper for Windows has been known to Linux users for years for its functionality with Wine but in the past couple of years the project has been producing 'native' Linux builds. On top of these DAWs (and also new to AVL-MXE 2020) are additional versatile Audio plugin choices with Demos provided by **Applied Computer Music Technologies**, **Audio Assault**, **Auburn Sounds**, **Cut Through Recordings** and **OvertoneDSP** (64bit AVL-MXE only).

Commercial Demo Plugins running in Harrison Mixbus32C:



Purchasing and Registering the Demos :

All of the Commercial Demos are limited in some way and are not fully functional until they are purchased and registered. The limitation methods vary from not all options being available, dropouts in sound, generated noises at certain intervals etc. Each Vendor has their own method of handling purchasing and registration as well. Harrison, Applied Music Technologies and OvertoneDSP all provide a license text file upon purchase that can be copied and pasted in the Users home folder. Once this text file is present the software will find it the next time it is launched and will appear as registered and be fully functional. With this method there is no need to remove the demos and replace them you can leave them installed as they are and merely add the text key.

In the case of Reaper you can evaluate it unlicensed for 60 days after which time you are expected to purchase a license and register it, the version that comes on the AVL-MXE ISO has its binary folder is wrapped in a Debian Package so it can be uninstalled with usual Debian Package tools, if you wish to use a newer version of Reaper simply uninstall the 'reaper6-linux' package with Synaptic and download and extract the usual Reaper Linux bundle wherever you like and use it from there.

Audio Assault, Auburn Sounds and Cut Through Recordings employ a different system where the User is given a special private download URL in an email once purchase and payment are completed and the User then downloads replacement Plugins which are fully functional. For this method it is necessary for the User to manually remove the installed demos using either Synaptic Package Manager or 'dpkg' command (shown below) and then install the replacement plugins as instructed by the individual Vendor.

To remove Audio Assault, Auburn Sounds or Cut Through Recordings Demo versions from your system you can either search for 'audioassault-demo-plugins', 'auburnsounds-demo-plugins' or 'ctrecordings-demo-plugins' in Synaptic, then remove them or alternately open a Root Terminal and issue this command:

dpkg -r audioassault-demo-plugins

dpkg -r auburnsounds-demo-plugins

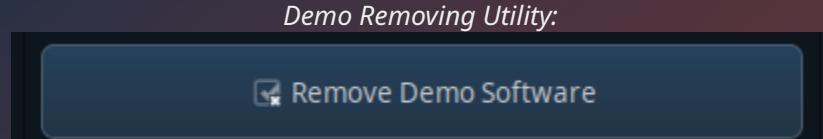
dpkg -r ctrecordings-demo-plugins

Detailed information on installing the replacement Plugins can be found at the Vendors respective websites linked at the beginning of this section. In most cases it is suggested to create a '.vst' folder in the User's home folder for Linux VST2 Plugins and a '.lv2' folder for LV2 Plugins and copy your Registered versions there.

**NOTE – Both Ardour and Harrison Mixbus (the default DAW Applications included in AVL-MXE) do not automatically search for Plugins in the User's home so these folders must be added to the Plugin search paths manually in Ardour and Mixbus. Plugin search paths can be edited in the 'Edit'→'Preferences'→'Plugins'→'VST' menus of both Ardour and Mixbus.*

Hey Wait! Not For Me! :

With the knowledge that not everyone necessarily wants to have or purchase Commercial Software and that some may prefer for ideological reasons to use only Open-Source applications you can of course choose remove the Commercial Demos from AVL-MXE. For this reason removing all of the Audio Demoware from AVL-MXE is as easy as a one-button click in the AVL-MXE Assistant!



Thanks and Acknowledgements

The Debian/GNU Linux Distribution

MX Linux Developers – dolphin_oracle, fehlix, Adrian, Bitjam, Stevo, SwampRabbit

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Korakios – CPU governing utility

Tony Brijeski – Yad/Zenity Scripts

RockHopper – H2 and SFZ Thunar Custom Actions, Shuriken Beat Slicer

Yann Buchau – Thunar Image Custom Actions

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Filipe Coelho – KX Studio Repositories

Paul Davis, Robin Gareus, Ben Loftis – Ardour/Mixbus

osxmidi – LinVST, SFZero

aciddose – Xhip synth and plugins

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DarK Icons

Special Thanks:

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