

PulseAudio

– the next generation sound system

PulseAudio is the next generation sound system which is meant to replace and unify all sound servers. This article will present how to use it.

Sound was available under GNU/Linux via the *Open Sound System* (OSS) and then via the *Advanced Linux Sound Architecture* (ALSA) since kernel 2.6. However, when the system contained more than one sound device (which is more and more common on modern computer where there is at least a sound card and a webcam), the automatic setup was problematic. Moreover, in order to cope with some limitations on sound cards (for instance when more than one application was trying to get exclusive access to the device), sound server were developed on GNOME desktop (*esd*) and KDE desktop (*artsd*) but were of course incompatible each other.

In order to overcome all those problems, *Lennart Poettering* has initiated a new sound system, PulseAudio. Mandriva Linux 2008.1 is the first edition where the server is activated by default. A very important tracking of bugs has been done in order to provide the best experience possible to the final user, so if you encounter a sound problem, you should first incriminate another component before this one.

We will now detail how the sound server works and the major programs used to manage it.

PulseAudio – from basement to attic

PulseAudio is meant to be a complete replacement for all the existing sound server (it is already the planned replacement for *esd*), but will also bring new functionalities, like a different sound volume per application, on-the-fly displacement of the sound stream and even sending the sound through the network easily. If you want to get the details of the whole implementation, the complete diagram is available at <http://rudd-o.com/archives/2007/11/05/how-pulseaudio-works/>.

You will see all the layers where PulseAudio is or may be involved. That was not really a complete visit, but let's go now to the main purpose of this article, putting the hands inside PulseAudio.



Figure 1. Pavucontrol, monitoring all the sound volumes in one window

PulseAudio in practice

Since the server is new, there are many tools available to adjust and monitor the server behavior. We will review most of them, but to be completely fair, even if the server version seems “unstable” (i.e. below 1.0), no error was noticed during the tests (thanks Colin for the great job he did in including the server in the distribution). To be more complete, all the sound experience was perfect on a system containing an integrated sound system, a webcam and a PCI SB Live!, including the full 5.1 surround experience.

Since some tools are used to monitor the server in action, they may not be installed by default (for instance pavucontrol). If you want or need them, just install them using the graphical package installer `drakrpm/rpmdrake` or from the command line via `urpmi`.

Pavucontrol

PulseAudio Volume Control (Pavucontrol) is the graphical application allowing to mix the sound volume on the fly. It works on hardware volume but also provides a per application volume. This flexibility permits to hear in the background your favorite song while watching a flash video on a web site. An illustration, we see on the Figure 1 the volume for `artsd` is 100% but the sound for the `vlc` application (Video Lan Client) is only at 70%.

Being able to define the sound volume from only one place is really a major improvement and would be already a good justification to switch to PulseAudio. In fact, you are probably familiar with the problem arising when you want to temporarily reduce the volume of one application (for instance Amarok) in order to listen to another application (VLC). Before, you would need to show the Amarok main window, reduce the sound volume, go back to the `vlc` application and then listen to it. Now you can do this all in once using the main PulseAudio synthetic window!

Another very interesting feature comes from the possibility to



Figure 2. Moving on the fly the VLC audio flow. In order to complete this action, right click below the application name, select Move Stream and redirect to the desired output (the actual flow is indicated by the check mark located on the left of ALSA PCM... (ADC Capture...))

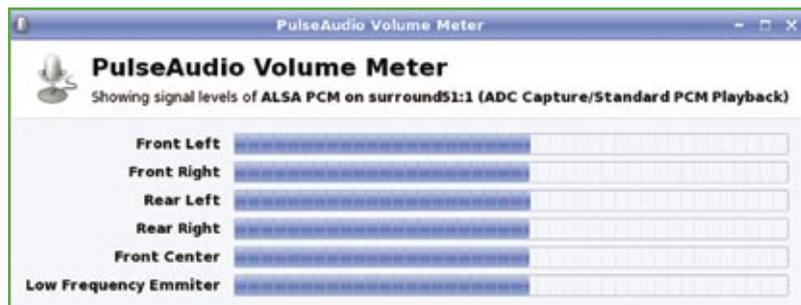


Figure 3. Real-time monitoring of the sound output on each channel in a 5.1 “surround” system



Figure 4. PulseAudio main control window. You will get the main server parameters in the first tab and in the other tabs, all the hardware and virtual devices managed by the server. This graphical manager should help you in controlling everything is in place and working as expected

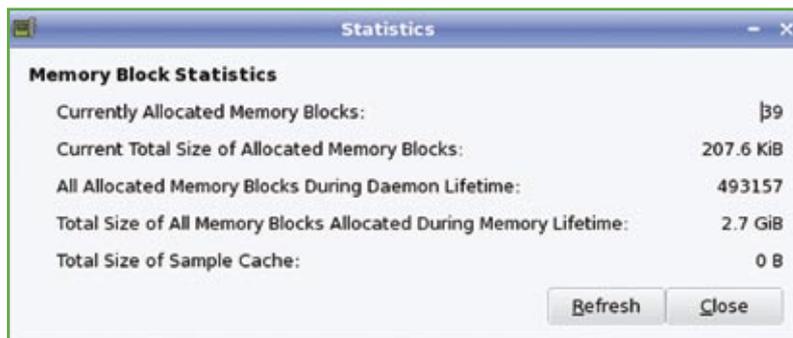


Figure 5. Memory usage by the server available under the Paman Statistics tab

move on-the-fly the destination of an audio stream. In order to do so, right click on the application in *Pavucontrol* (see Figure 2), and redirect the sound to the desired device. This could be useful when you would like to send the sound flow of a DVD to your multimedia sound system (for the rest of your family) while still listening your favorite ogg song in your headphones.

Pavumeter

Pulseaudio Volume Meter (Pavumeter) shows in real time the audio volume level. This allows to monitor the mixer setting, this is in particular useful when you are fine tuning the individual sound level of your 5.1 sound system (see Figure 3).

Paman

PulseAudio MANager (Paman) is the central server manager. It

contains the global properties of the server (version, state, default output), the hardware managed by the server, the clients connecting to the server, and the modules loaded at run time. The main window is presented in the Figure 4. Paman should only be necessary to control how the hardware is managed by PulseAudio since in most cases everything should work flawlessly.

In order to see the server in action, just press the *Statistics* button on the first tab of the window (see Figure 4). You will get the real-time report of the job done by the server like the memory blocks used by the server since the start of the computer, and details concerning the current sound output (see Figure 5).

Paprefs

PulseAudio Preferences (Paprefs) allows you to control the server.

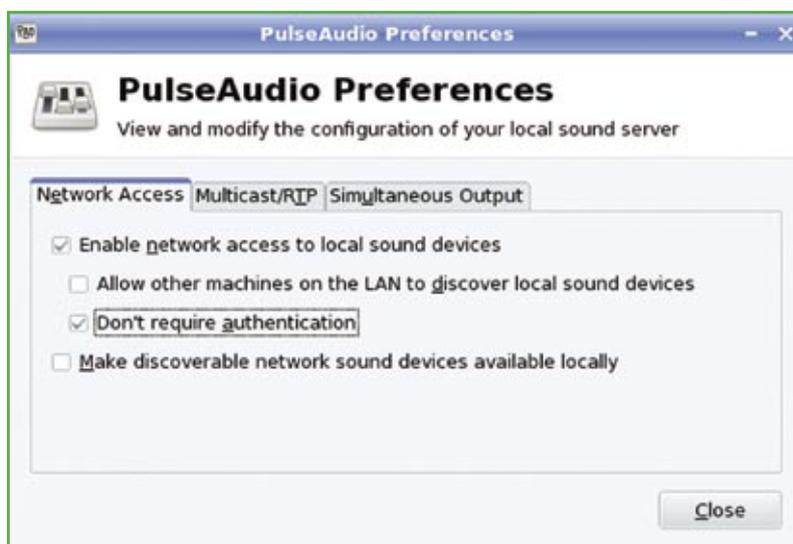


Figure 6. Paprefs with the network sharing support enabled

From this interface, you will be able to redirect the sound output through the network and to share it to other computers on this network if they connect to the PulseAudio server. By default, no redirection is enabled, but in order to illustrate the sound redirection, the setup to allow an unrestrained connection to the server is presented in Figure 6.

This setup is very permissive, but do not forget that by default, Mandriva comes with a strict security policy, so if you really want or need to share the sound through the network, you will need to open the desired ports with *drakfirewall* (for instance the port 5353 for the zeroconf protocol).

Under the *Multicast/RTP* tab, you can define the rules for sharing the sound over the network (for instance to hear the latest Mozart requiem on all your home cinema system, a little bit like in a skyscraper lift...). In the *Simultaneous Output* tab, you can define a virtual device for aggregating all the hardware devices in one device, for instance to output on all sound cards the same sound at the same time.

PadevChooser

Pulse Audio device Chooser (PadevChooser) is the desktop applet which permits rapidly to access to the principal PulseAudio preferences (see Figure 7).

More precisely, it allows to:

- notify the user if a new sound device is available on the network,
- switch easily the default audio output device for the running graphical environment,
- start the other main PulseAudio programs (Pavucontrol, Pparameter, Paman, Paprefs).

Pasuspender

Although a great work has been done in providing the most complete experience with PulseAudio and many applications, there is

a domain where PulseAudio is not sufficiently supported yet, the proprietary applications like Skype. In order to temporarily disable the sound server for these applications, the developers have provided *pasuspender*. This will allow an easy migration if you have to use those problematic applications (RealPlayer seems still problematic also, while Flash-Player works flawlessly due to the presence of libflash support in PulseAudio).

To use it, you need to launch the program from a console:

```
Syntax: pasuspender ↓
        <program>
Example: pasuspender skype
```

Testing PulseAudio

It is not easy to present a sound server in a paper magazine, but we'll see in some images how you can migrate the sound flow from one sound card to another one. Launch the Pavucontrol application.

- From a console, we will listen to a system sound, long enough to have the time to modify easily the sound destination: `paplay /usr/share/sounds/KDE_Startup_new.wav`.
- In order to move the sound stream from the main sound card to the onboard sound card, right click on the flow assigned to "paplay: /usr/share/sounds/KDE_Startup_new.wav" (between the "Front Left/Front Right" labels), a menu dialog opens up as presented in Figure 8.
- Select the second sound card (here "ALSA PCM on surround51:0 (AD198xAnalog) via DMA") and relax the mouse button. The sound is now output on the other sound card as easily as this! Note that this will be available only for this audio stream and will last even after the end of the sound. In fact the mixer setting is automatically kept for



Figure 7. *Padevchooser*, the applet for easy access to the PulseAudio server

this application until you move its destination again (see Figure 9).

Mastering PulseAudio

Although a great work has been done in Mandriva 2008.1, there may be specific cases where your system is not fully functional with PulseAudio. This can come from your specific sound card system, some problems with unusual programs. We present here some tips that may help you in getting the best experience possible in little time.

Third party softwares

There are still some applications which cannot use the PulseAudio server natively. They most belong to the proprietary industry but some are free softwares programs and/or games. To get the best experience possible, you will need to adjust the parameters by editing some configuration files,

fortunately, most of the explanations are available at the address: <http://www.pulseaudio.org/wiki/PerfectSetup>.

Using a "surround" sound system

If you are the lucky owner of a surround system (be it 5.1, 6.1, 7.1,...), you will need to activate this setup in PulseAudio since the auto-detection from the server does not allow it (yet?). The *draksound* wizard (Figure 10) allows to configure a 5.1 system, but you may want to adapt to your own situation. In order to do so:

- Edit `/etc/pulse/daemon.conf` file and uncomment:


```
"; default-sample- ↓
channels = 2" (remove ↓
";")
```
- Change "2" for taking into account the total amount of speaker (including the

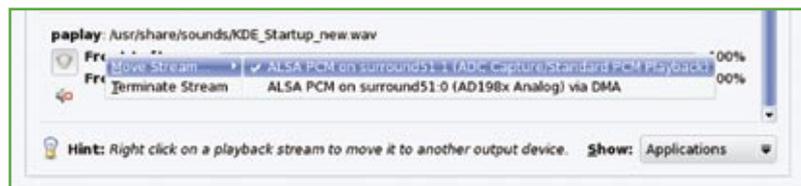


Figure 8. The flow output is for the moment directed to the default sound device

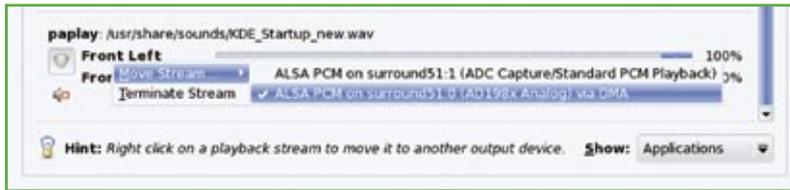


Figure 9. The audio stream for `KDE_Startup_new.wav` is now automatically redirected by default to the other sound card, until a new modification is done

subwoofer), 6 for a 5.1 system, 7 for a 6.1 system...

- Save the file and relaunch the PulseAudio server (log off and in of your session, even reboot if you want to be sure everything is properly started).

You should now here the sound in all your speakers!

Disabling PulseAudio

If you have tried all the above solutions (manually editing some configuration files, seen the errata and looked at the forums), you can easily deactivate it using `draksound` (see Figure 10). However most problems seen with PulseAudio were related to the migration from previous releases of Mandriva (in order to verify this, create a new user using `userdrake` and see if this user has the same problem). Most of the time you should not need to deactivate PulseAudio. Last, really, before disabling it, update the system completely (via

the `mandrivaupdate` applet in the task bar) and have a look at the errata: http://wiki.mandriva.com/en/2008.1_Errata.

Conclusion

At last! It was very long years with a complex sound system support in GNU/Linux, in comparison with other modern operating systems. The system was complexified by the uneven driver support, the complexity of handling multi-devices systems and the incompatible implementations of sound servers by the most popular desktops.

Mandriva 2008.1 is the first release enabling PulseAudio by default. In a system containing three sound devices (two sound cards and a webcam), the system is automatically configured to output the sound on the correct hardware (in the past, the sound was sometimes redirected to the webcam which has no output mixer), and it is easy to modify independently



Figure 10. Activation and modification of the PulseAudio server behaviour from the graphical wizard `draksound` (available through the Mandriva Control Center at Hardware -> Sound Configuration

the sound volume per application as we saw.

Mandriva 2008.1 is now available to the whole community (not only to the persons willing to debug it during the beta/rc cycles) and so far it is a great accomplishment. There are of course new tools to play with but with some experience, you will rapidly get comfortable with it and enjoy the on-the-fly modification of the output stream.

Moreover, since this is a server, it is accessible through the network like any other server and then allows you to send a stream towards your home cinema system, providing an easy way to transform your computer into a powerful multimedia station.

Welcome in the Third Millenary for sound in GNU/Linux. ★



Going further

- <http://www.pulseaudio.org/>
- <http://en.wikipedia.org/wiki/PulseAudio>
- <http://pulseaudio.revolutionlinux.com/PulseAudio>
- <http://live.gnome.org/PulseAudio>
- <http://fedoraproject.org/wiki/Interviews/LennartPoettering>
- <http://www.linux.com/feature/119926>
- <http://forums.debian.net/viewtopic.php?t=12497>
- http://gentoo-wiki.com/HOWTO_ALSA_sound_mixer_aka_dmix



PulseAudio programs

- <http://Opointer.de/lennart/projects/pavucontrol/>
- <http://Opointer.de/lennart/projects/pavumeter/>
- <http://Opointer.de/lennart/projects/paman/>
- <http://Opointer.de/lennart/projects/padevchooser/>
- <http://Opointer.de/lennart/projects/paprefs/>
- <http://www.pulseaudio.org/wiki/PerfectSetup>