Demudi: The Debian Multimedia Distribution

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Abstract

This paper introduces DeMuDi, the first Multimedia Distribution for GNU/Linux. It states the need for this project, presents its goals, current state, and also covers some technical aspects of the implementation.

1 Introduction

The GNU/Linux operating system is widely known as a robust base for running Internet servers, but has not reached yet a similar audience as a platform of choice for the musician and the multimedia artist. The DeMuDi project targets one reason of this issue, the lack of a GNU/Linux *distribution* oriented toward music and multimedia.

2 GNU/Linux and the free software community

The concept of *free software* was introduced in 1984 by Richard Stallman and the Free Software Foundation. Software qualifies as free software if its distribution license guarantees the freedom to run the program for any purpose, to redistribute copies, to study it and adapt it to the user's needs, and to change it and redistribute it once modified. (Stallman 1984)

The free software community that has built itself around those principles has been involved in the development of the free operating system GNU/Linux, a completely free Unix-like operating system using the GNU system, Linux kernel and other free software packages.

Most parts of GNU/Linux are distributed under a particular license, the GNU General Public License. This license guarantees and protects the user's freedom by defining the conditions under which the software and its source code must be made available, as access to the source code is a precondition for realization of the user's freedom.

The development model of free software, where the availability of the source code and the right to modify and redistribute it allows review of the source code by many independent developers, has also proven to produce much more reliable software. A consequence of this recognized stability can be seen in the wide adoption of GNU/Linux to run the World Wide Web and other Internet servers.

2.1 Music and Multimedia on GNU/Linux

Music and video production can benefit greatly from the advantages of free software. First, by being able to modify the software, users can adapt it to their particular artistic needs. Then, free software is intrinsically a cooperative enterprise and favors the emergence of virtual communities where a user can benefit from the experience, help, and developments of other users. Finally, the availability of powerful applications at a reasonable cost and with the freedom to redistribute them is a major advantage for dissemination of creative works and for education.

From a more technical point of view, GNU/Linux offers a solid base for music and multimedia applications, with its highly reliable Unix-based multitasking kernel, its high quality networking support, and the numerous development tools available.

Formerly, GNU/Linux was less suitable for music and multimedia applications: lack of drivers for high-end multichannel audio cards, lack of applications such as soundfile editors, multitrack recording/playback,... This situation has improved greatly in the last few years and GNU/Linux now supports a wide range of multimedia applications, as can be seen on Dave Phillips' "Linux Sound and Music Applications" web site (Phillips 1998; Phillips 2000), which lists more than 800 applications.

Furthermore, three recent events have confirmed this improvement:

- the release of the latest ALSA drivers, giving Linux an advanced set of drivers that support high-end audio and MIDI cards in a highly optimized architecture (Kysela and Bagnara 1999)

- the development of LADSPA (Furse 2000), a plug-in environment offering a free alternative to VST (a standard plugin architecture for Windows audio applications)

- the stabilization of "low-latency" patches for 2.4 Linux kernels, leading to kernels that can sustain a 1 millisecond latency even under high load conditions, thus solving an issue with traditional kernels that can have up to 100 milliseconds of scheduling jitter and are as so unsuitable for real-time audio applications

Despite this very favorable evolution, it is still difficult for end users who have installed GNU/Linux from a standard distribution to turn their machine into a powerful workstation for audio and music that would allow them to do multi-track recording and mixing, or run real-time synthesis applications and off-line sound generation and processing tools. The main reason for this difficulty is that all the necessary applications, drivers, libraries…do exist, but they are not assembled together in a well tested distribution.

3 Why Demudi

3.1 What is a GNU/Linux Distribution

A GNU/Linux distribution is a coherent assembly of all the components of a GNU/Linux system, from libraries and system components over the kernel and drivers to applications, that has been extensively tested. The distribution's *installer* automates the machine setup process by probing hardware, helping users choose optimal installation parameters and automatically configuring the system.

It has become obvious that one key reason of the success of GNU/Linux is the emergence of several distributions that greatly ease the installation task. Among others, the distributions that should be mentioned are Debian, Mandrake, Redhat and Suse.

The Demudi project (for *De*bian *Mu*ltimedia *Di*stribution) aims to provide for the musician and artist a GNU/Linux distribution dedicated to music and multimedia that would ease installing and customizing GNU/Linux for their needs.

Demudi is not actually a distribution in itself. Taking advantage of the existing Debian distribution, it enhances a Debian distribution by a collection of packages containing music and multimedia applications or development tools.

The Debian distribution has been chosen, because it is the only distribution that is developed entirely by volunteers over the Internet, just like a significant part of the GNU system, the Linux kernel and many applications. Additionally, it supports several different hardware architectures.

3.2 Demudi Organization

Demudi developers are volunteers working over the Internet. Work is organized by a consortium of two important research centers devoted to multimedia: Centro Tempo Reale (project leader) in Florence and XDV from Austria, which are being assisted by the Free Software Foundation Europe in terms of resources, free software background and licensing. Demudi development follows the same rules used by the Debian developers: all developers volunteer and there is a total participation in the decision-making process by all developers.

4 Demudi's Content

As previously noted, a distribution consists of the system components, the kernel, the applications and distribution-specific software like the installer and configuration tools that glue everything together.

One of the most difficult tasks of building a software distribution is to make all the components work together, like kernel drivers with the applications that use their interfaces, specifically in the quickly evolving free software multimedia world.

This section describes the components of Demudi and gives insight to what has been done in order to make the system specifically fit for multimedia applications.

4.1 The Demudi Installer

Debian as a distribution is mainly targeted to the professional user, therefore the installation process is very complicated and the user has to decide how the system should be setup. Demudi provides its own, easy to use installer which minimizes the user interaction during installation and limits the software selection task to a few questions, regarding the later purpose of the system.

4.2 Kernels and Audio Card Drivers

The patched kernels for low-latency are not available in standard distributions, but are unavoidable for real-time audio applications and therefore naturally find their way in Demudi.

As previously noted, a traditional weakness of Linux have been solved by the recent releases of the ALSA drivers. These drivers are not yet available in standard distributions and will be included in Demudi.

4.3 The Applications

Demudi's packages are grouped into different categories according to their purpose:

- Soundeditors

- Multitrackers

- Software Synthesis

- MIDI + Trackers

- Compression + Internet
- CD Production
- Miscellaneous Tools
- Notation
- Visualization
- Speech
- Video and Graphics
- Development Tools

This section will present some of the software that is included in Demudi, in order to give an overview of what the user can expect.

Sound editors Several sound editors are included. One of the richest in features is probably *Snd*, developed by Bill Schottstaedt at CCRMA. Snd has builtin scripting abilities in the Guile language, supports interfaces to Common LISP Music, LADSPA, and an arbitrary number of sounds with an arbitrary number of channels.

Multitrackers GNU/Linux has recently seen an explosion of software for multitrack recording. All of these, if in a reasonably stable state will be included in Demudi.

Software Synthesis Several software synthesis packages are available. We will just list some of them, and point the reader to the supplied references for further information: PD (Puckette 1996), Nyquist (Dannenberg 1997), Rtcmix, (Garton and Topper 1997), jMax (Déchelle et al. 1999), STK (Cook and Scavone 1999).

Compression and Internet The tremendous success of MP3 on the Internet showed a new way of music and multimedia distribution. Demudi tries to support this trend, but offers more possibilities than any other GNU/Linux distribution by supporting the free OggVorbis format for lossy compression of Internet audio content. (Xiphophorus 2001)

Video and graphics Recently video support has become a standard feature of every GNU/Linux distribution. Demudi includes the professional grade nonlinear video editing software Broadcast2000. The feature list of Broadcast2000 is long, but some of the outstanding facets are Quicktime and Firewire support, multiple audio/video tracks and effect plugins.

5   Conclusion and Future Work

The Demudi project targets a first release of the distribution by mid-2001. Depending upon its adoption and support by the free software computer music community, further releases will be envisioned.

The work of the Demudi project is not limited to the Debian distribution only. Being distributed under GNU's General Public License, it can benefit other distributions, especially those distributions based on Redhat's "RPM" packages.

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References

Cook, P. and G. Scavone (1999). The synthesis toolkit (STK), version 2.1. In *Proceedings of the International Computer Music Conference*. International Computer Music Association.

Dannenberg, R. (1997). The implementation of Nyquist, a sound-synthesis language. *Computer Music Journal 21*(3), 71–82.

Déchelle, F. et al. (1999). jMax: an environment for real-time musical applications. *Computer Music Journal 23*(3), 50–58.

Furse, R. (2000). Linux Audio Developer's Simple Plugin API (LADSPA). `http://www.ladspa.org`.

Garton, B. and D. Topper (1997). RTcmix – using CMIX in real time. In *Proceedings of the International Computer Music Conference*. International Computer Music Association.

Kysela, J. and A. Bagnara (1999). Advanced Linux Sound Architecture. `http://www.alsa-project.org`.

Phillips, D. (1998). Sound & MIDI Software For Linux. `http://sound.condorow.net`.

Phillips, D. (2000). *Linux Music and Sound*. San Francisco, California: No Starch Press.

Puckette, M. (1996). Pure Data. In *Proceedings of the International Computer Music Conference*. International Computer Music Association.

Stallman, R. (1984). GNU's Not Unix! - the GNU Project and the Free Software Foundation (FSF). `http://www.gnu.org`.

Xiphophorus (2001). Ogg Vorbis documentation. `http://www.xiph.org/ogg/vorbis/docs.html`.