

PAWN & SPAWN: Portable and Semi-Portable Audio Workstation

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Abstract

PAWN consists of a laptop running Linux with full duplex audio input and output abilities. Its primary function is to facilitate performance by eliminating the need for rack mounted synthesis equipment and effects processors. It is capable of reading / writing MIDI data through MIDIator (tm) serial MIDI interface. Hence it also works well within the traditional electroacoustic and studio models. The range of systems under which Linux can run makes PAWN an affordable solution. It can be configured on a high end state of the art machine, as well as one several generations old ... at reduced cost. Being an open system, cost is limited only by hardware configuration.

SPAWN is a self contained rack-mounted system consisting of a multiprocessor Linux workstation equipped with RME digital audio io cards piped into DA and AD converters . As many as 24 channel audio output is currently possible. For performance situations that require intensive computing power beyond the ability of single processor stations, SPAWN provides an effective portable solution. PAWN and SPAWN can be used in conjunction by means of 100mbt ethernet connection.

The primary software platform used is RTcmix with the SLINC gui. Other software platforms are also supported such as Csound and PD. PAWN and SPAWN will be demonstrated using the various components. Design considerations related to portability, performance, and cost will be discussed.

I. Overview and Motivation

PAWN and SPAWN attempt to bridge several technological gaps while at the same time provide a stable and persistent platform for audio development under the Linux operating system. Simply put, the gaps are between: the Open Source software paradigm, commercial viability, performance ready music workstations, and computer music under Linux. The basic goal currently is to provide a performance platform that sits somewhere between a high end package like Max/MSP and a popular commercial synthesizers like the Korg X5.

This trend is by no means new to the Linux community. As Linux, once a term familiar only to geeks and software engineers, has become more popular dozens of Linux based companies have emerged. Their emergence has helped further promote Linux as a viable platform. There are currently dozens of Linux distribution and hardware vendors. To name a few: RedHat software, Caldera systems, VA Research and ASL workstations.

By creating a nicely packaged product that is easy to install, distribution vendors have been the most influential in spreading Linux popularity. RedHat is a perfect example. Beyond nice packaging, new trends have also emerged. Vendors have begun to channel funding into Linux development. The GTK project, for example, has been receiving key support from RedHat over the past few years. Support is also often more subtle along the lines of donated systems, majordomo and newsgroup lists and the like. Feedback has also developed as Linux hardware vendors have begun to use distributions sold by other vendors.

It is an understatement to say that it has made it into the mainstream. Yet multimedia applications and platforms using Linux are still in their infancy. PAWN and SPAWN are direct attempts at helping that trend mature. They are the outgrowth of the same new type of thinking that motivates Linux distribution vendors. Sell the end product, not the

software itself. In essence, PAWN and SPAWN serve the function of distribution and hardware vendor providing systems specifically designed for computer music.

II. Issues

Development efforts for PAWN and SPAWN fall currently into two categories: finding compatible hardware and developing and testing new software to run on it. While the computer industry has been expanding at an exponential rate, the sad fact remains that not every piece of hardware supports Linux. Some frequently cited reasons are copyright considerations and trade secrets. Since Linux is an open system, many vendors fear offering support might reveal special techniques that somehow give them an edge over competition. Ironically, the vendors now starting to support Linux are the leaders in their fields. Similarly, audio software development under Linux is also growing, but still running head on into difficulties. Popular applications that run under different operating systems are rarely ported. Vendors have yet to see Linux's virtues. This last reason has been a primary motivation for using RTcmix as the platform of choice. The SLINC interface is an attempt to make RTcmix more usable by the mainstream.

PAWN and SPAWN will shortly be available for purchase directly. But, like Linux vendor counterparts, the systems can also be built "for free" by the end user. This is part of the beauty of the paradigm. The commercial venture helps to promote open and free systems. The immediate question becomes, "Then why buy it?" The answer, simply put, is to save time and guarantee performance. Regardless, since the systems are open, they can also be modified and/or upgraded in terms of hardware and/or software. This too can be done commercially or freely.

III. Specifics and Examples

Literally dozens of systems were tested to arrive at the unique blend of performance, price and reliability. It became quite clear after very little testing that some systems were better than others. Vendor reputation for service was also taken into account. Both PAWN and SPAWN fall into several sub categories. In general, hardware systems tend

towards top of the line systems to keep pace with trends in hardware performance. The basic configurations are as follows. Lite systems are geared towards a lower cost/performance ratio.

PAWN

- HP Omnibook 6000 laptop
- Docking station
- RME Digi96 audio card
- Frontier tech. Tango/24 D/AD converter

PAWN Lite

- Dell Inspiron 7500 laptop
- Full duplex audio

SPAWN

- ASL Workstations Maquis series rack mount workstation
- RME Digi96 audio card
- Frontier tech. Tango/24 DA/AD converter
- Anvil ATA shockmount case

SPAWN Lite

- ASL Workstations Maquis series rack mounted workstation
- Dual SoundBlaster PCI audio cards
- SKB shockmount case

Testing for other DA/AD converters is underway, specifically, support for 24/96 multichannel audio converters like the RME ADI 8 Pro.

Examples of use currently fall under applications for real-time performance. With RTcmix and SLINC, a MIDI keyboard and joystick can be used to control various synthesis and effects processing parameters in real time. As many as eight input and twenty four output channels can be used simultaneously. Software is not limited to RTcmix, however. The hope is to provide working systems that make use of applications like Csound, PD and Jmax and other. Research and testing of other platforms is still underway as of the writing of this paper.

IV. Resources

More information (including pricing) on PAWN and SPAWN can be found on:

<http://www.audio-workstations.com>

RTcmix and SLINC can be downloaded via ftp:

<ftp://presto.music.virginia.edu/pub/RTcmix>
<ftp://presto.music.virginia.edu/pub/SLINC>

An excellent Linux resource:

<http://www.linux.org>

Some Linux hardware vendors:

<http://www.aslab.com>

<http://www.varesearch.com>

Some Linux distribution vendors:

<http://www.slackware.com>

<http://www.redhat.com>

An excellent resource for Linux audio:

<http://www.bright.net/~dlphilp/linuxsound>