

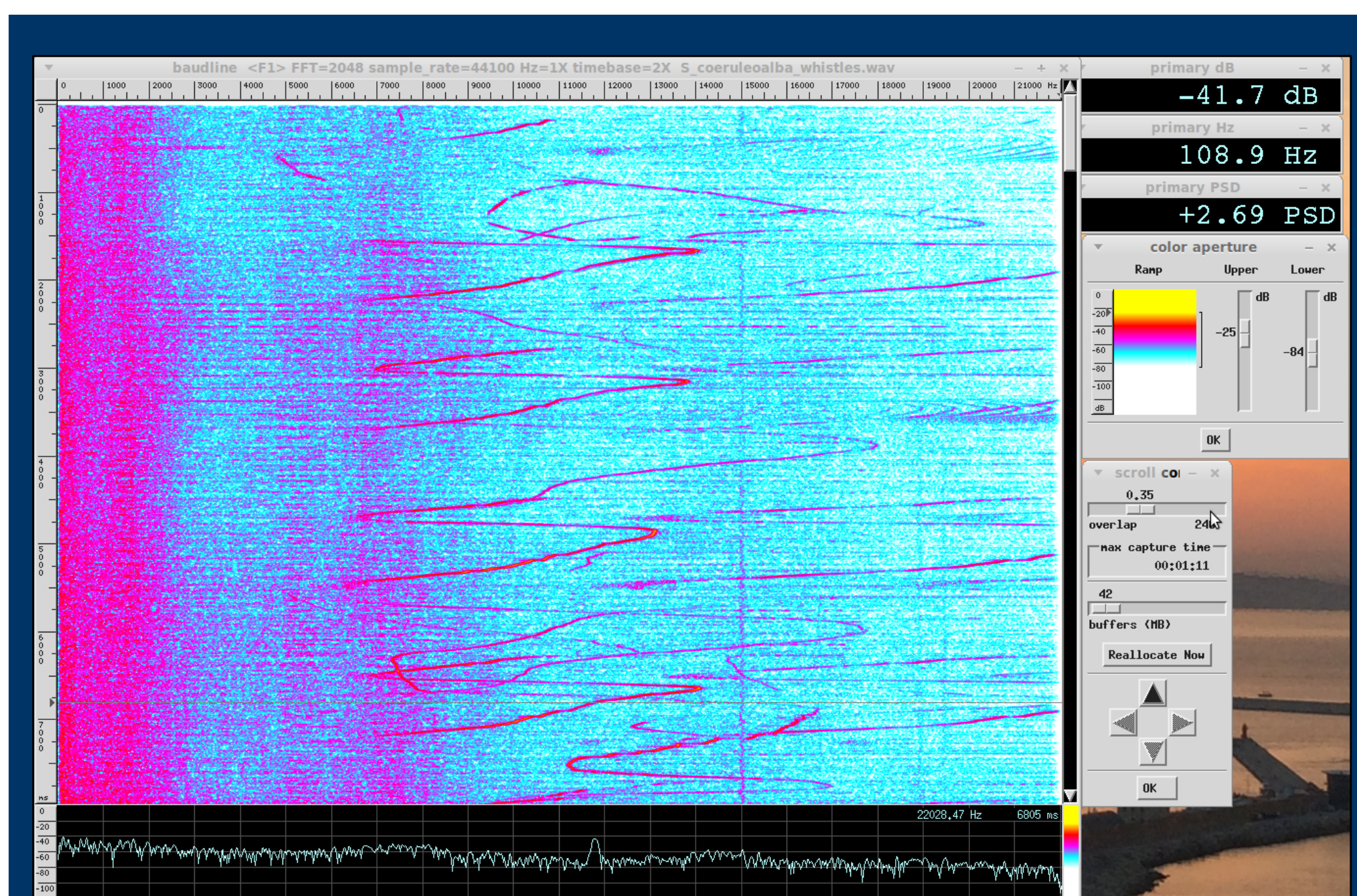
Linux, Jack (audio connection kit) and AMS (Alsa Modular Synth) for real-time signal processing in PAM



Rocco DE MARCO – rocco.demarco@cnr.it - Institute of Marine Sciences Ancona, Italy

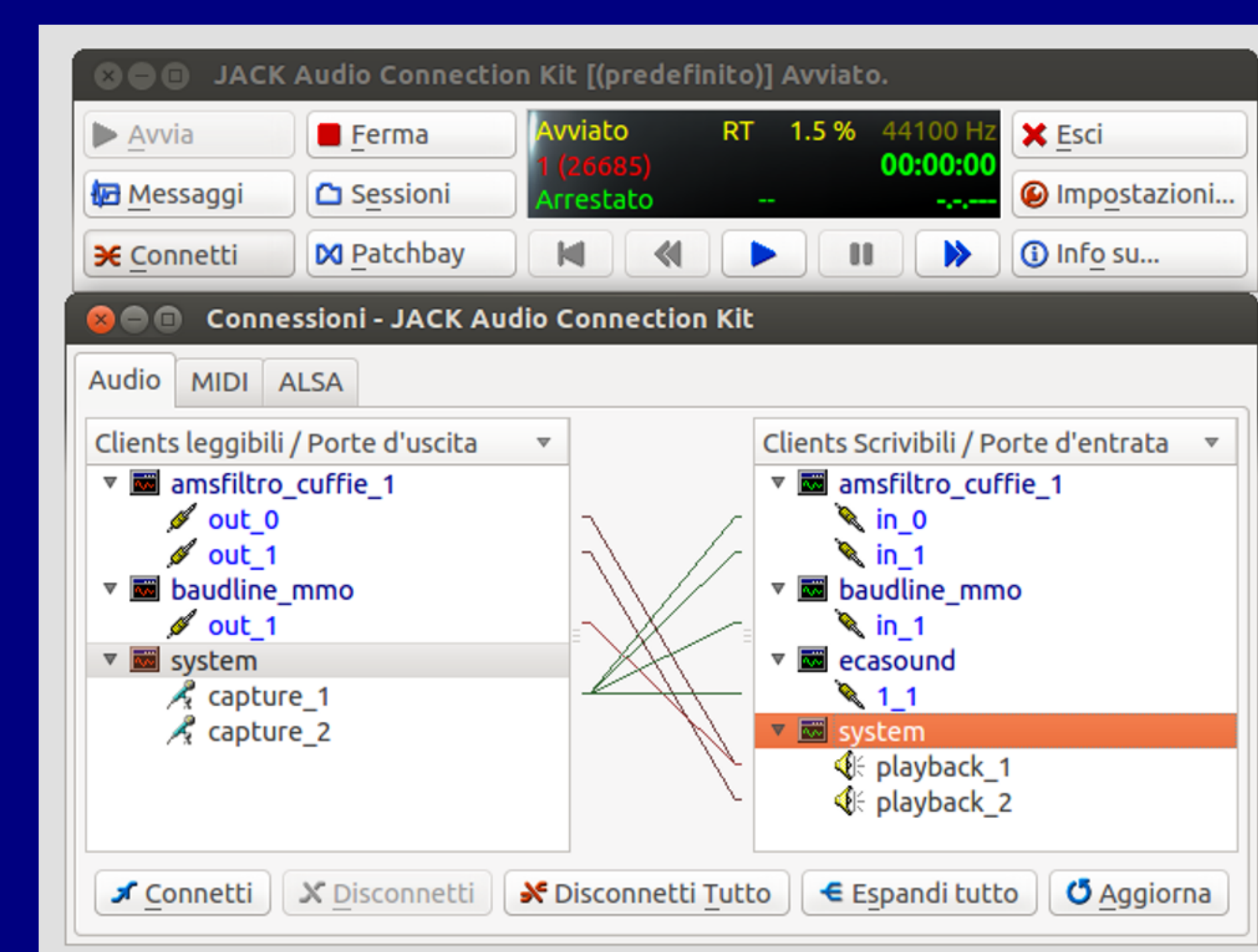


The Linux operating system is commonly considered robust and able to ensure high performances and reliability. Over the years, it has been increasingly employed for audio applications, as it offers tools to both professional (e.g. recording studios) and scientific purposes, like PAM



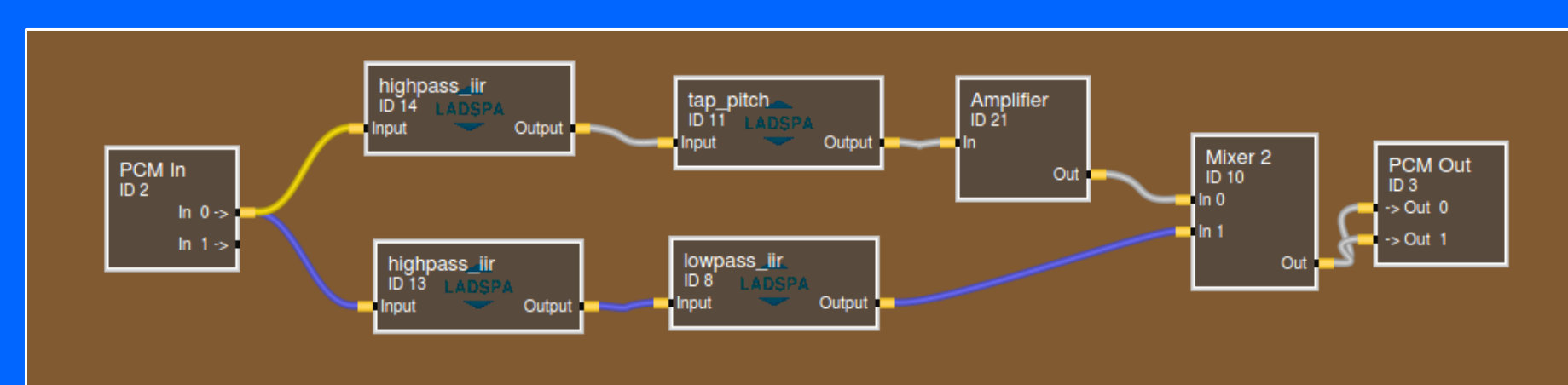
Customizable real-time spectrogram viewer

Jack is an open source audio infrastructure that allows real-time, low-latency connections for audio devices among applications. Through Jack it is possible to connect a sound source (e.g. two or more hydrophones) to one or more specific signal processing modules, so that the filtered sound is received by the headphones, the raw data is saved to disk and the spectrogram is shown on the display in real-time, all at once.

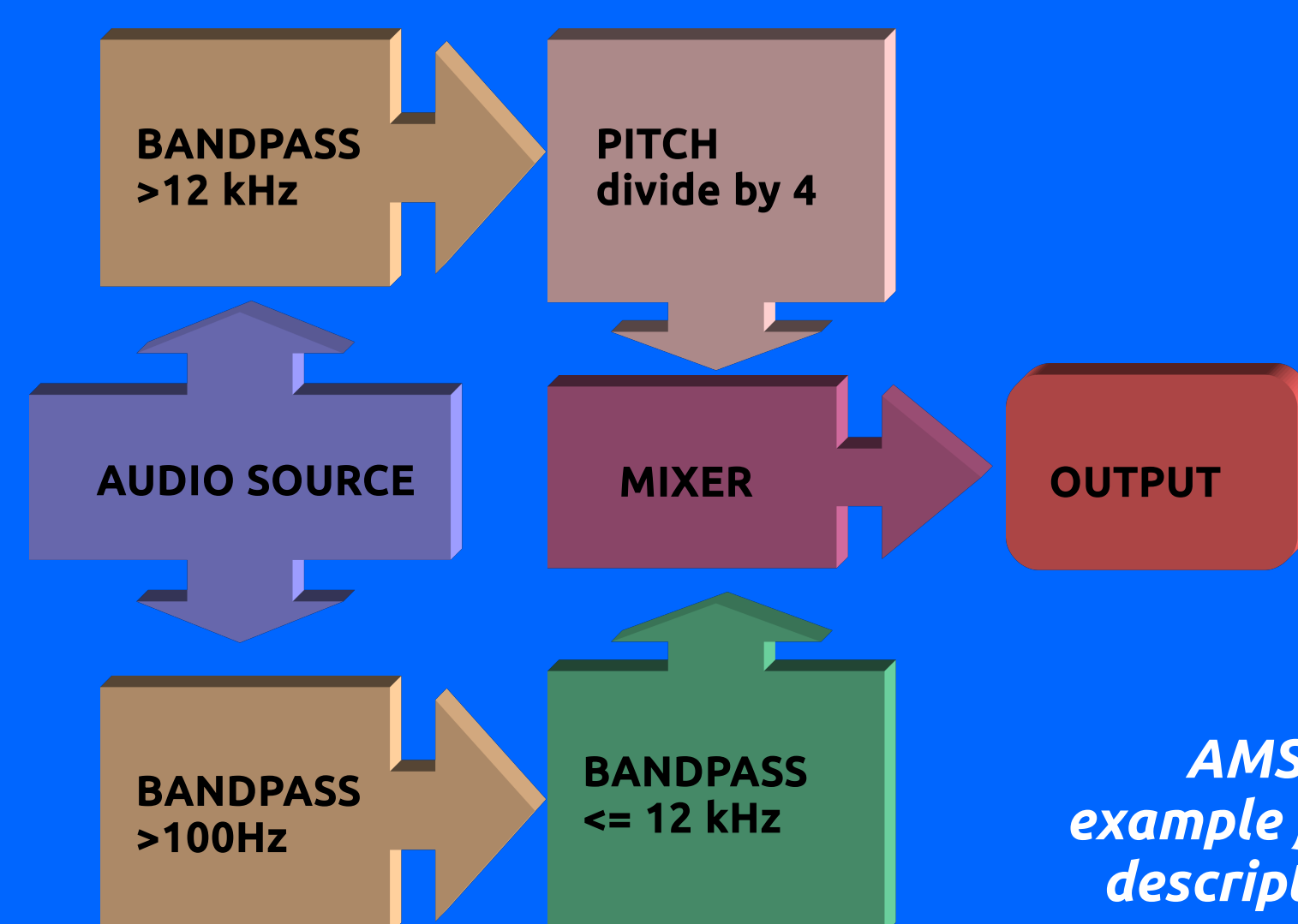


Linux and Audio

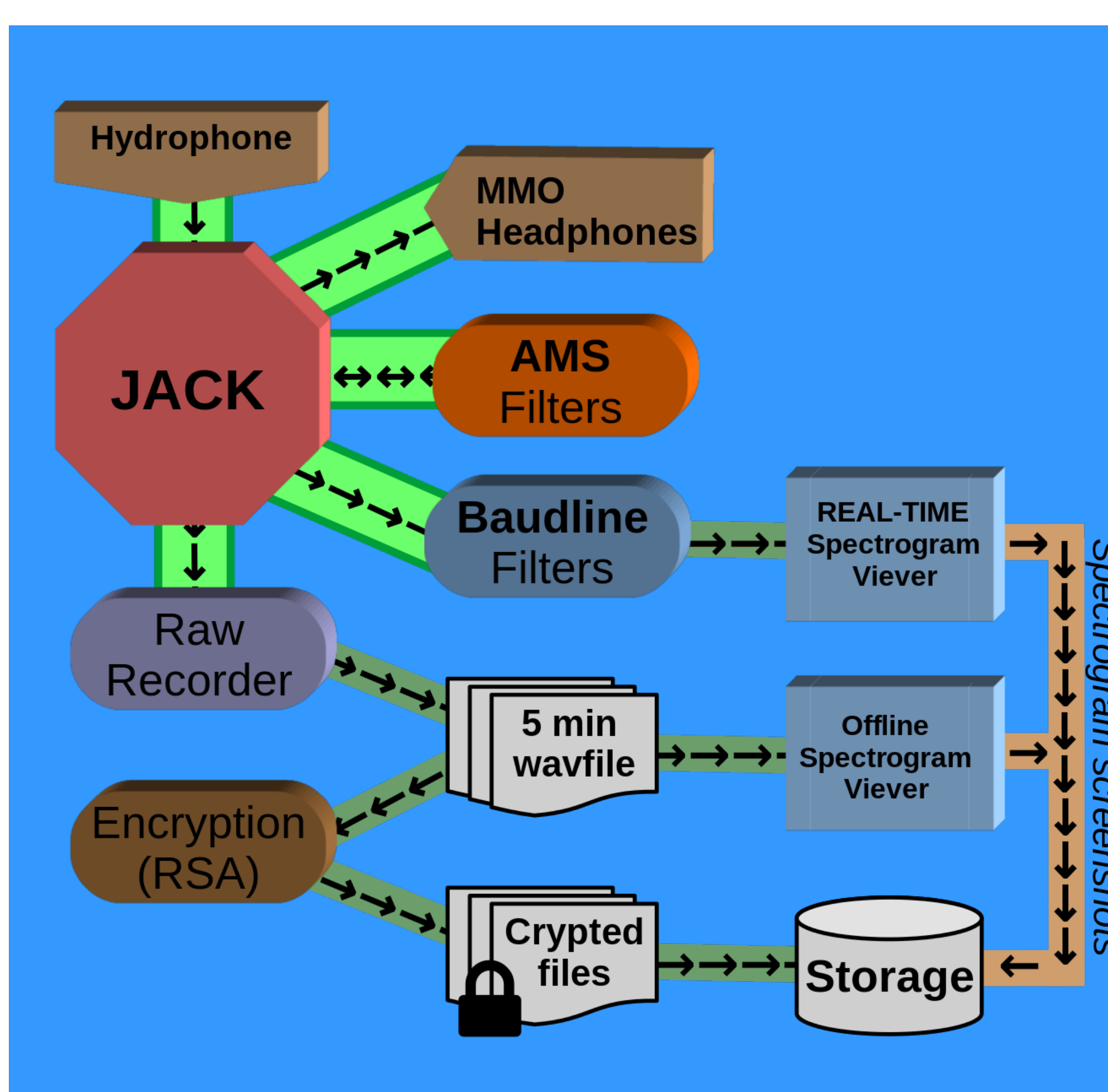
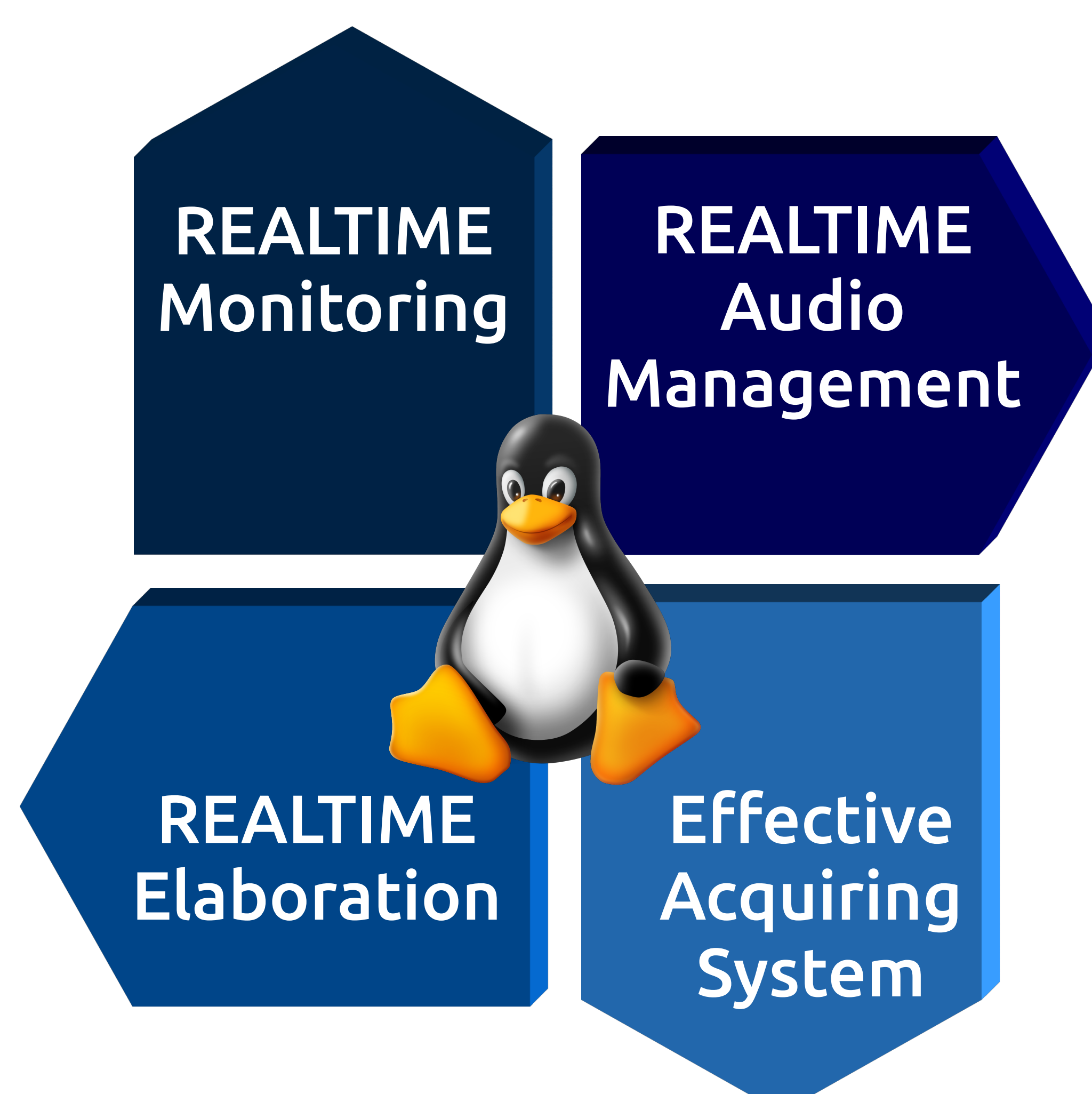
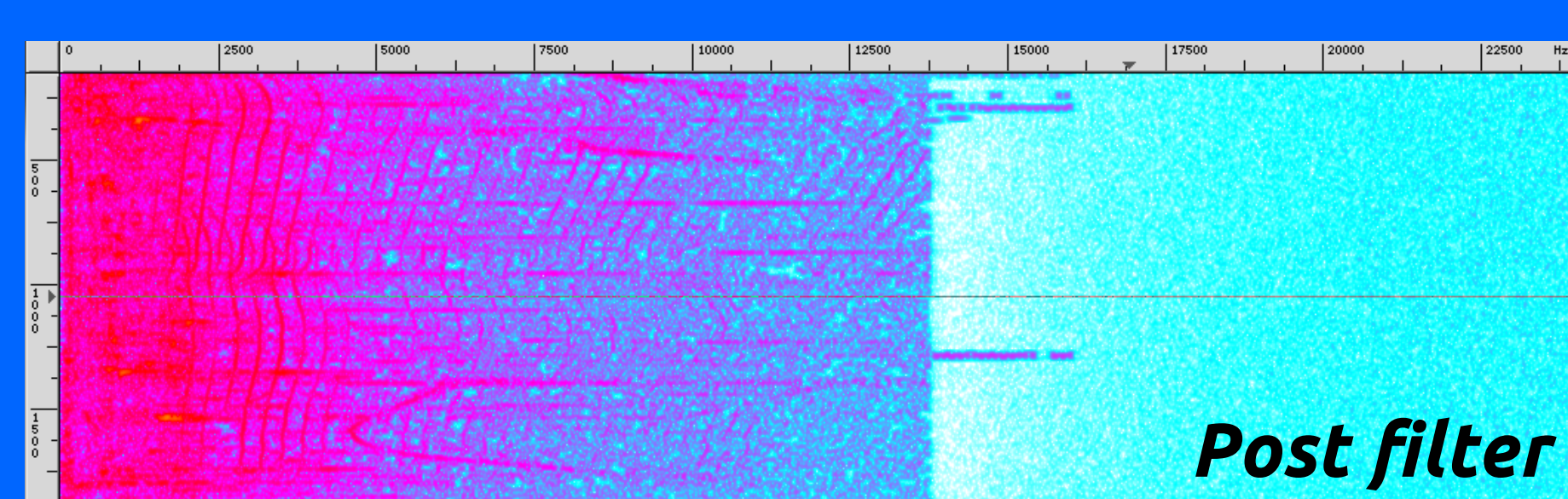
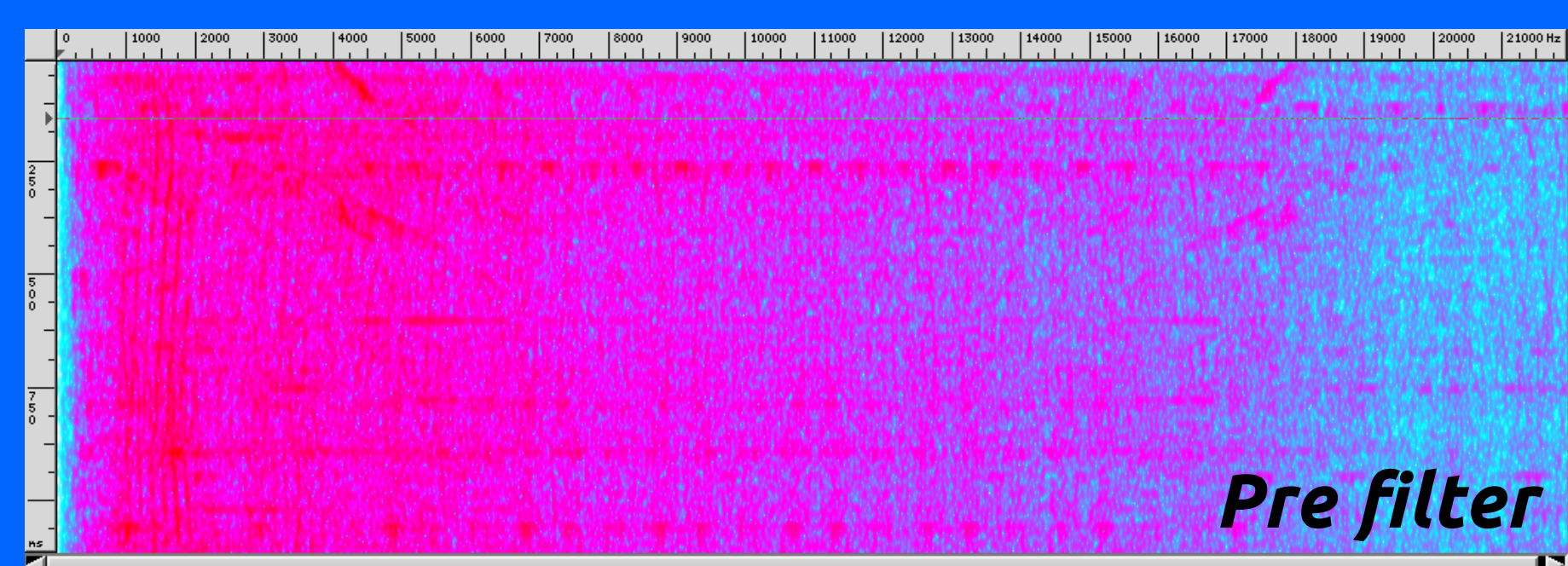
- Modern linux kernels support a wide range of professional sound interfaces.
- There are USB 2.0 interfaces able to acquire sounds at 192bps/24bit, also with balanced input(s).
- Preemptive linux kernels make possible to get very low latency levels (less than 10ms)



AMS (Alsa Modular Synth) is a real-time modular synthesizer and effect processor. It offers different kind of modules that are of great usefulness in PAM for several reasons: they avoid the need of analogic external devices for sound equalization, apply bandpass filters and, at last, discriminate among sound frequencies, therefore allowing the listening of cetacean clicks in real-time.



AMS example filter description



In 2014 a complete Linux acquiring system has been developed and deployed in several installations used for months during long time PAM monitoring.

The system has been planned to be able to record autonomously, providing a robust data management, with minimal requirements of settings or configurations done by the users (except the first setup in every monitoring site, that requires experts).

In every installation, a specific AMS filter has been customized, allowing the PAM operator to exclude particular sound sources or increasing the listenable event's range.

Conclusions

The use of Linux in conjunction with a high-level sound card and many available open source softwares allows the set-up of inexpensive PAM (Passive Acoustic Monitoring) stations able to operate 24/365 offering tools for REAL-TIME elaboration and monitoring.

Credits

Linux: <https://github.com/torvalds/linux/blob/master/CREDITS>, Jack <http://www.jackaudio.org/>, Alsa Modula Synt <http://alsamodular.sourceforge.net/>, Baudline <http://www.baudline.com/>
Tux logo by Franksouza183 <https://www.gnome-look.org/content/show.php?action=content&content=146084>, Dolphin image by OceanCare https://commons.wikimedia.org/wiki/File:Delfine_im_Golf_von_Korinth,_Griechenland.jpg
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