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Qtractor

An Audio/MIDI multi-track sequencer

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September 2008
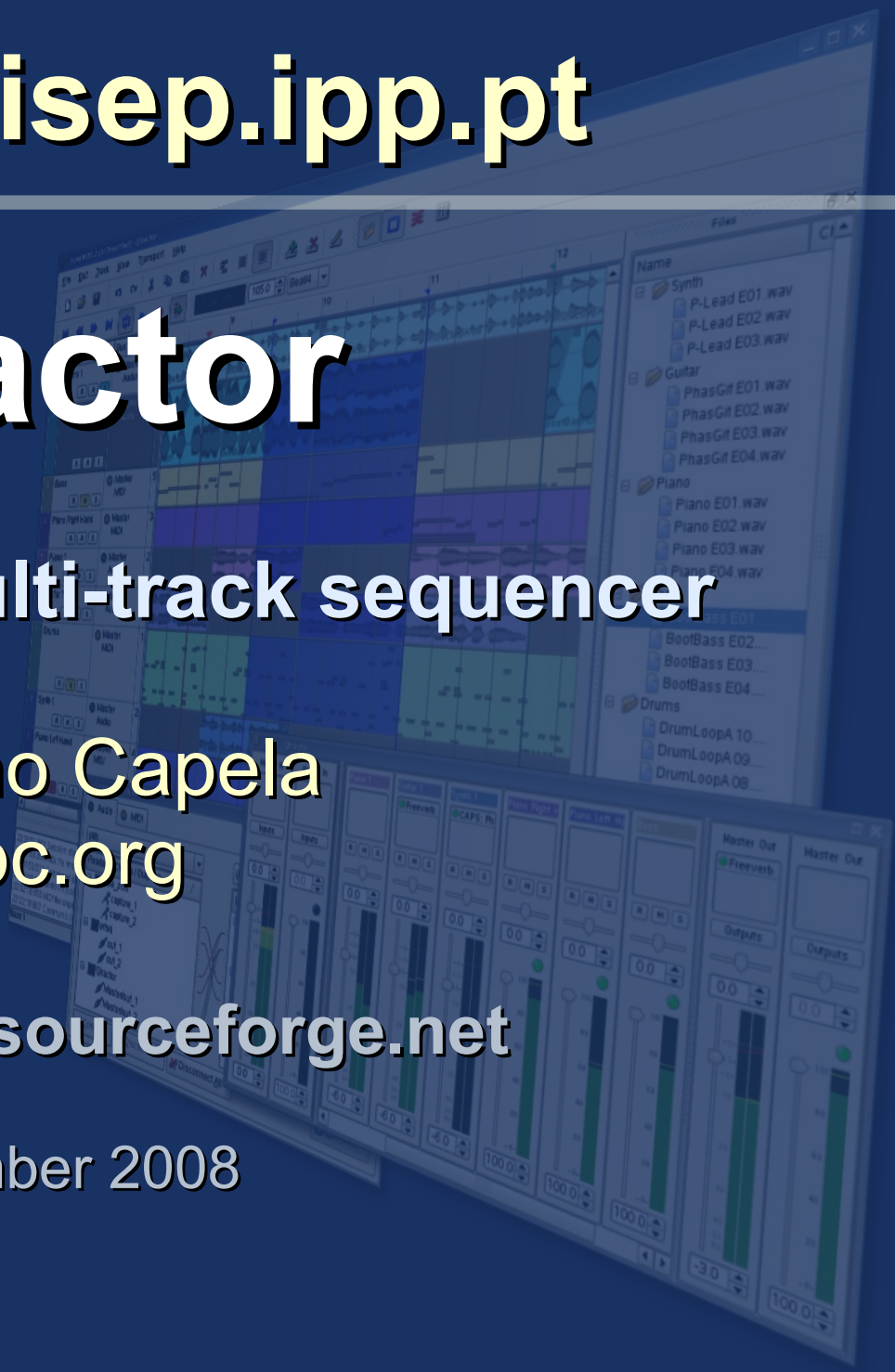
What is Qtractor ? (1)

Yet another Audio / MIDI sequencer ?

Yes ;-)

- **Multi-track paradigm**
- **Linux**
- **JACK**
- **ALSA Sequencer**
- **C++**
- **Qt 4**
- **GPL**
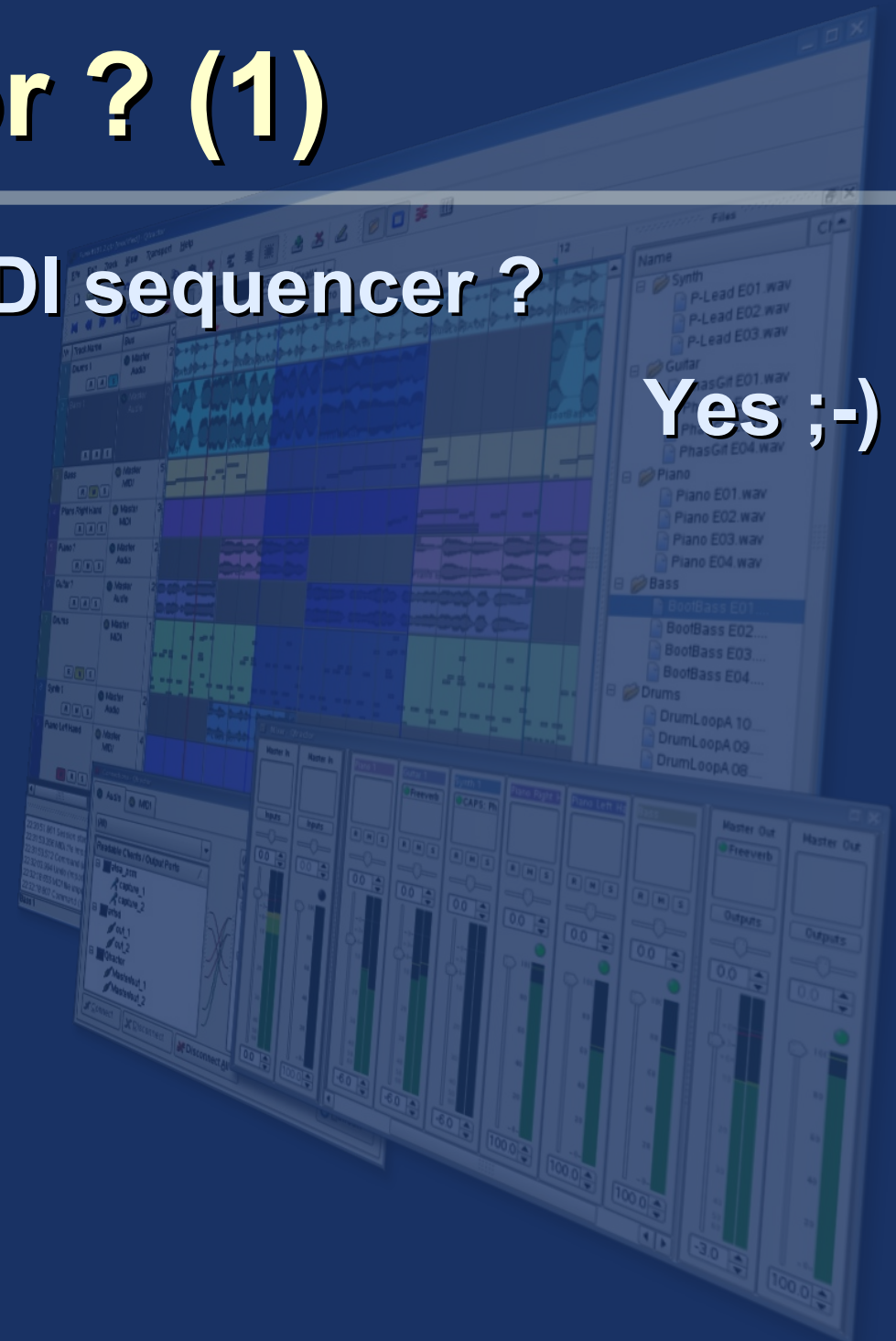
What is Qtractor ? (2)

- **Home-studio DAW GUI**

- **Intuitive and easy to use (hopefully)**

- **Music-making playground**

- **Not for the erudite (no score editor)**

- **Techno-boy bedroom studio, anyone?**

- **Not a revolution, will evolve . . .**

- **Why not Ardour ?**
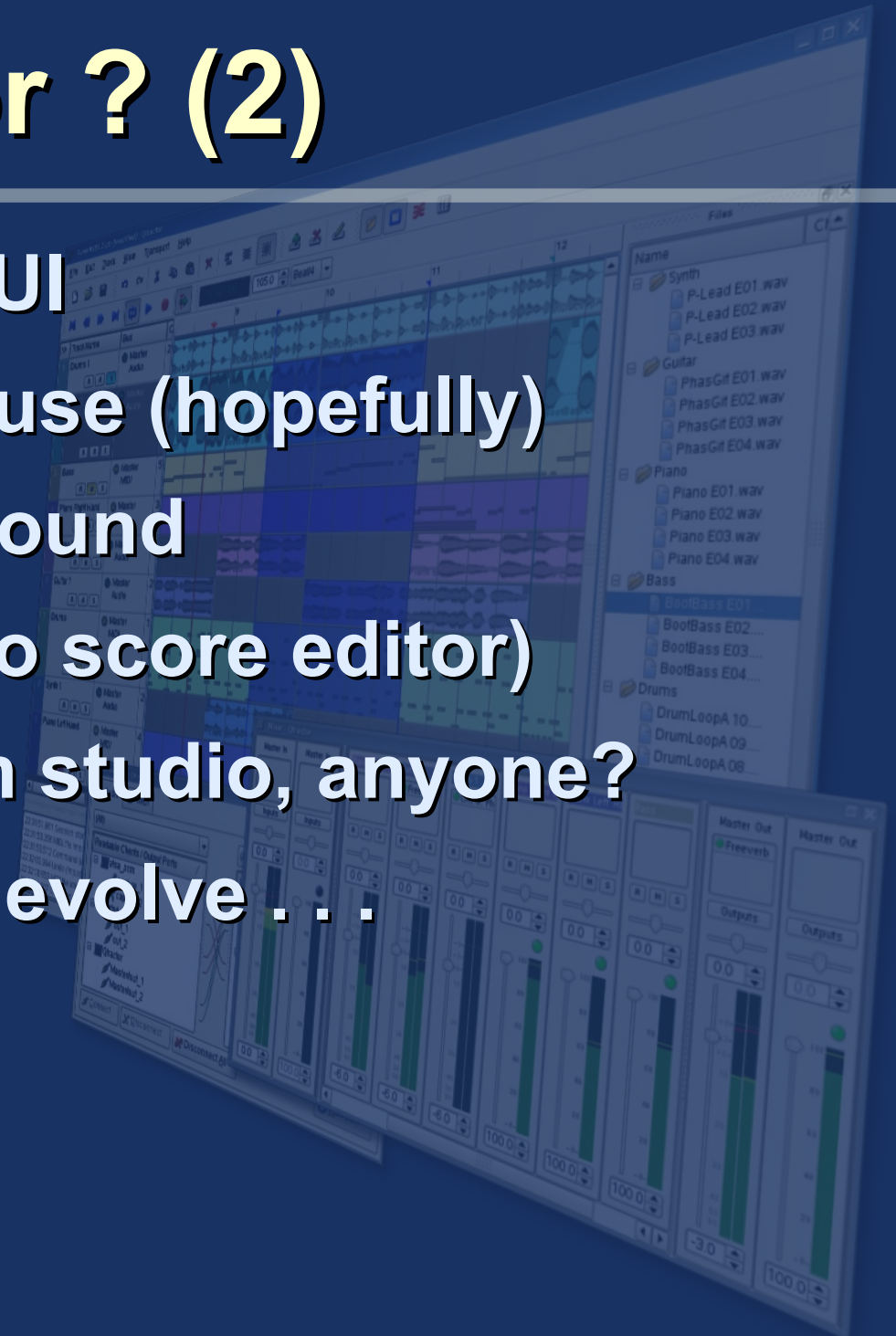
Who is behind ?

Hobby work of one developer

- **me, rncbc a.k.a. Rui Nuno Capela**

LAD Portfolio

- **QjackCtl**
- **Qsynth**
- **Qsampler**

A *gift economy* player :-)

But why ?

- **Just for fun**

- **The motive . . .**
  - Long time enthusiasm on electronic music

- **The skill . . .**
  - A half-life on programming (>20y)

- **The moment . . .**
  - An extraordinary event alignment occurred in the whole Universe . . .

So that was it !

Where can get it ?

qtractor.sourceforge.net

- **Still alpha, but...**

- **Fully functional (no *not-implemented-yets*)**

- **What You See Is What Is Working**

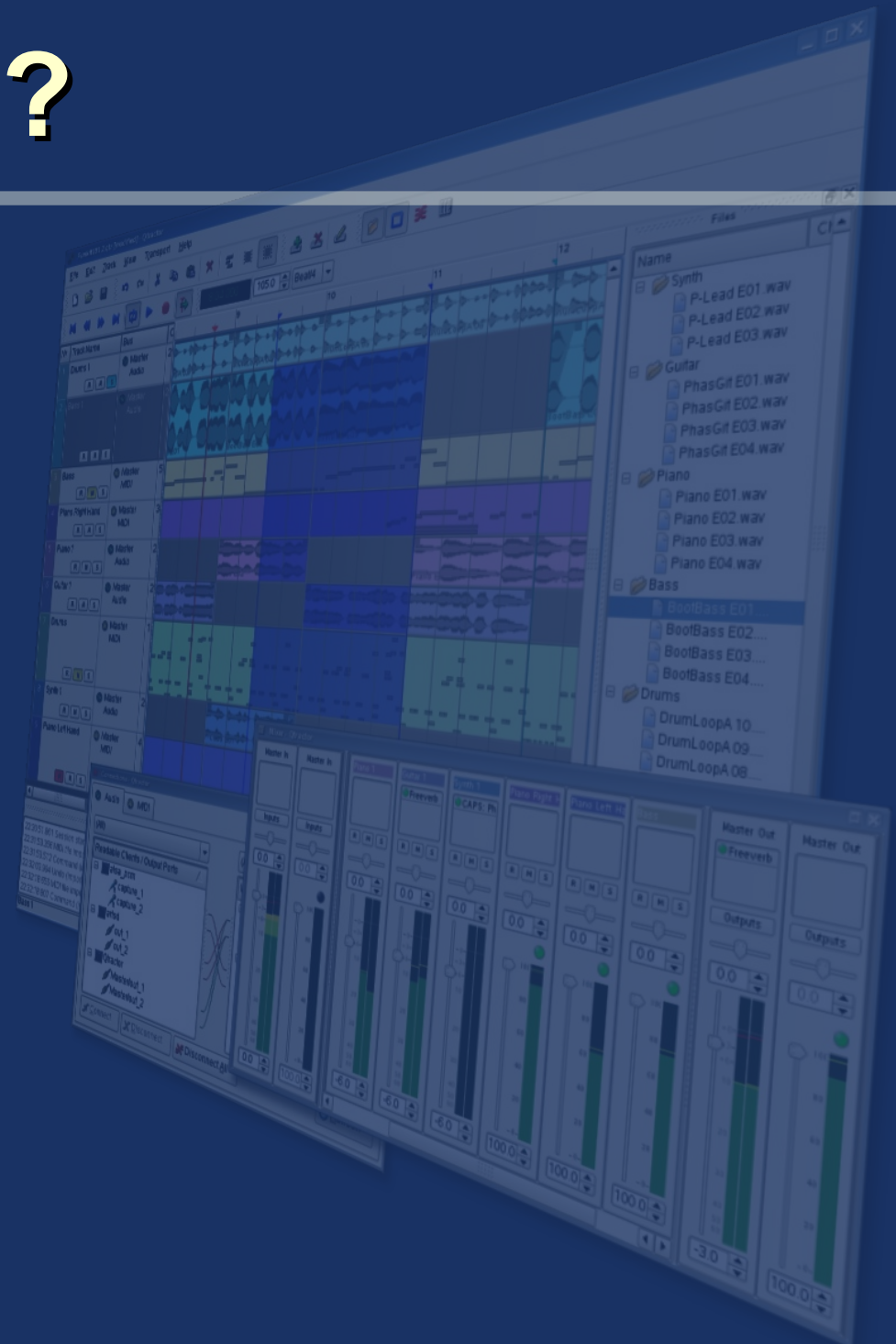- **Bugs'R'Us**

- **WIP**

Open for Business (no money involved)

- **users, developers, players, nurturers . . .**

What do I need ?

Requirements

- **Mandatory**
  - **Qt 4 (core, gui, xml)**
  - **JACK**
  - **ALSA**
  - **libsndfile**
- **Optional**
  - **libvorbis (enc, file)**
  - **libmad**
  - **libsamplerate**

Screenshot !

GUI
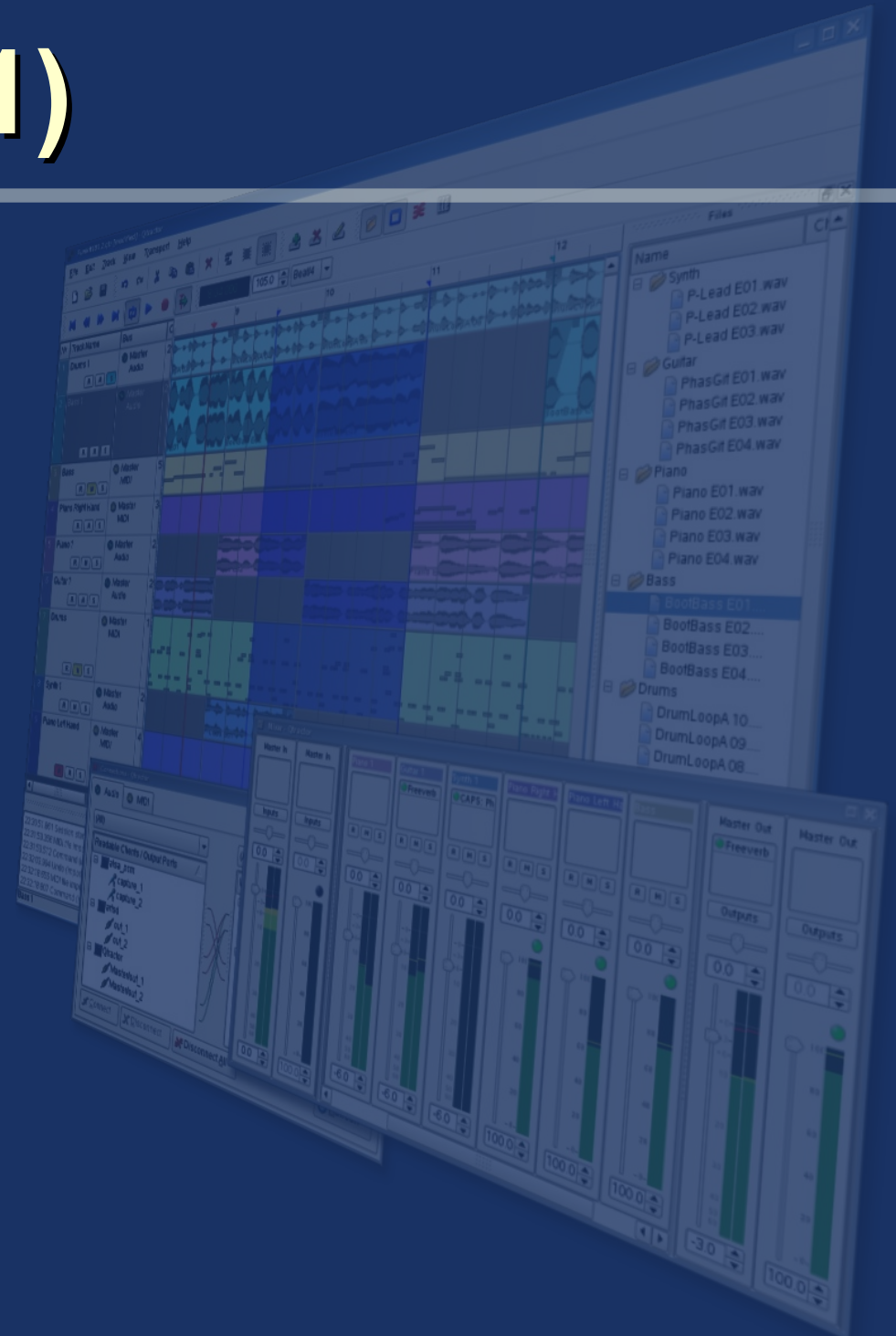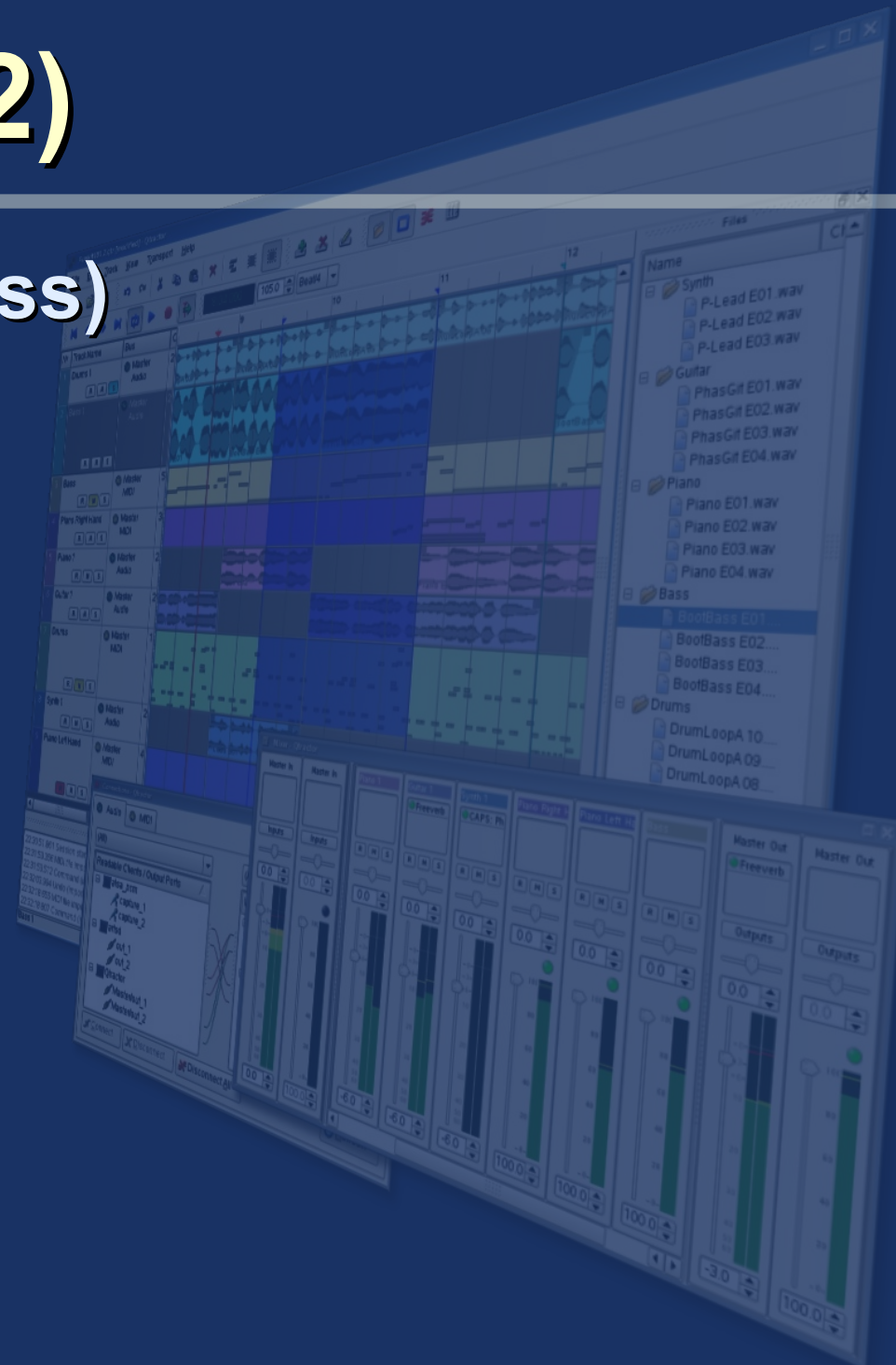
GUI Elements (1)

(business as usual)

Main window

- Menu

- Tool-bars

- Workspace (canvas)

  - Track list

  - Track view

- Status-bar

GUI Elements (2)

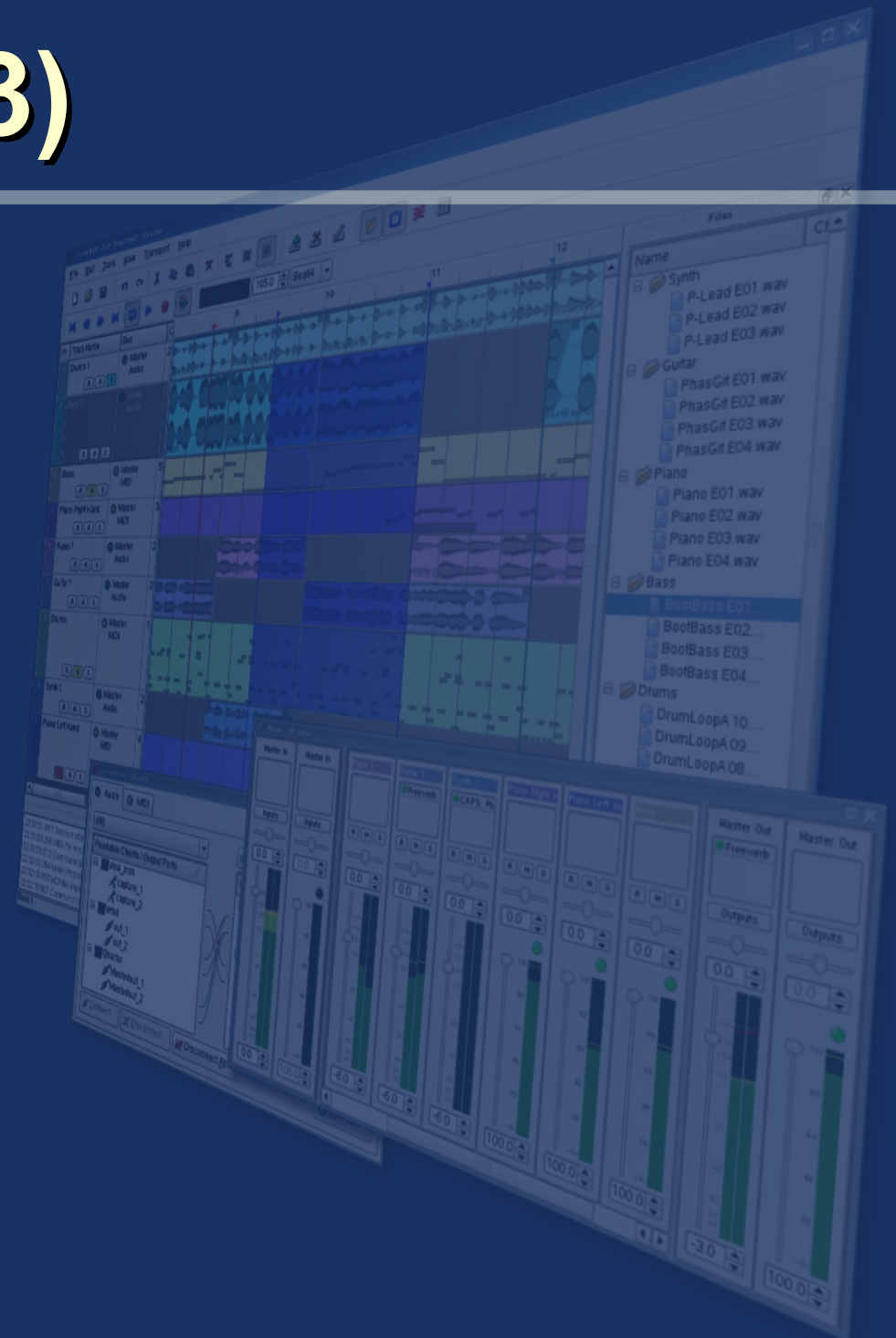## Tool windows (modeless)

- **Connections**
- **Mixer**
- **Files**

- **MIDI Editor (per clip)**
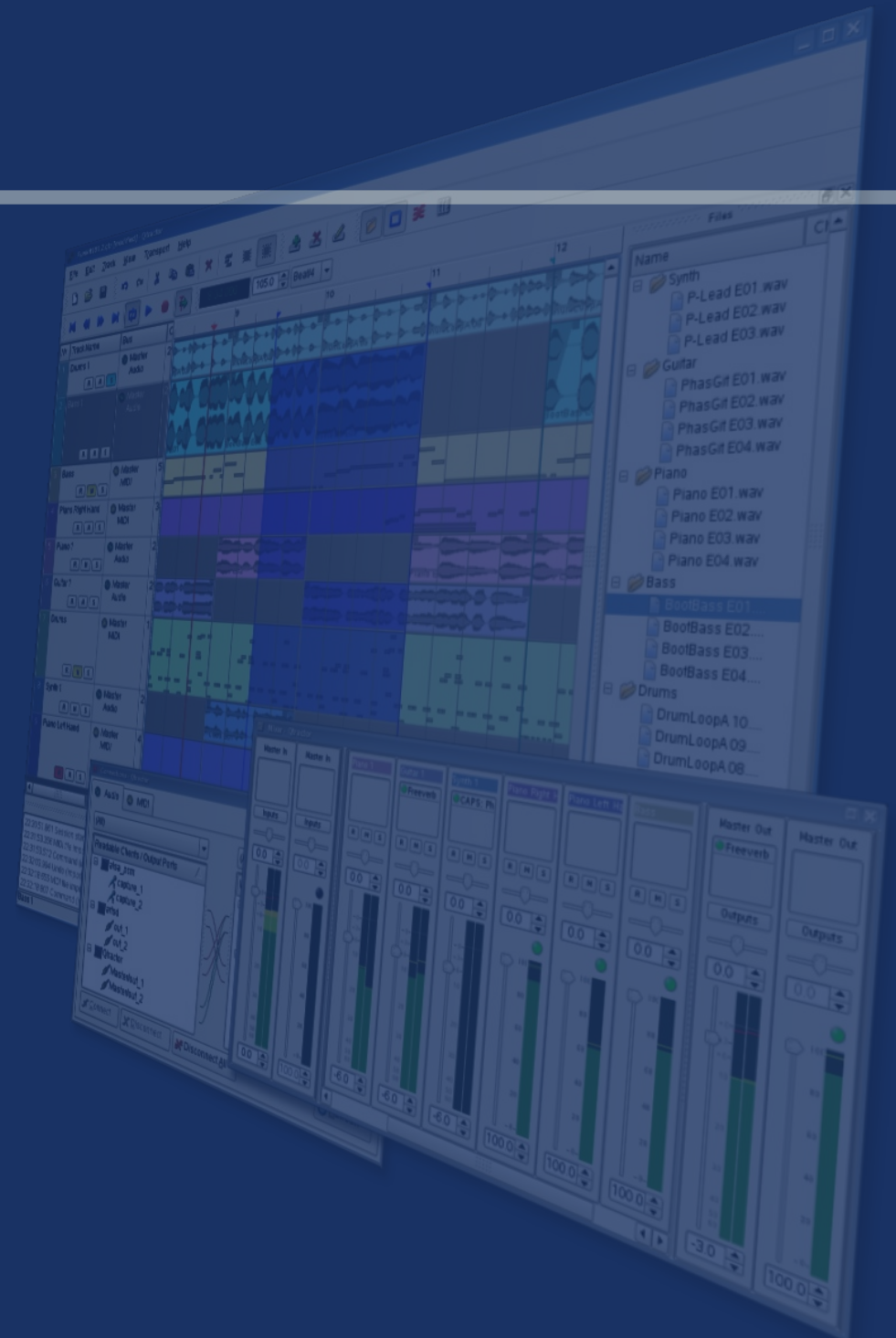
GUI Elements (3)

Dialogs (modal)

- **Session properties**
- **Track properties**
- **Bus configuration**
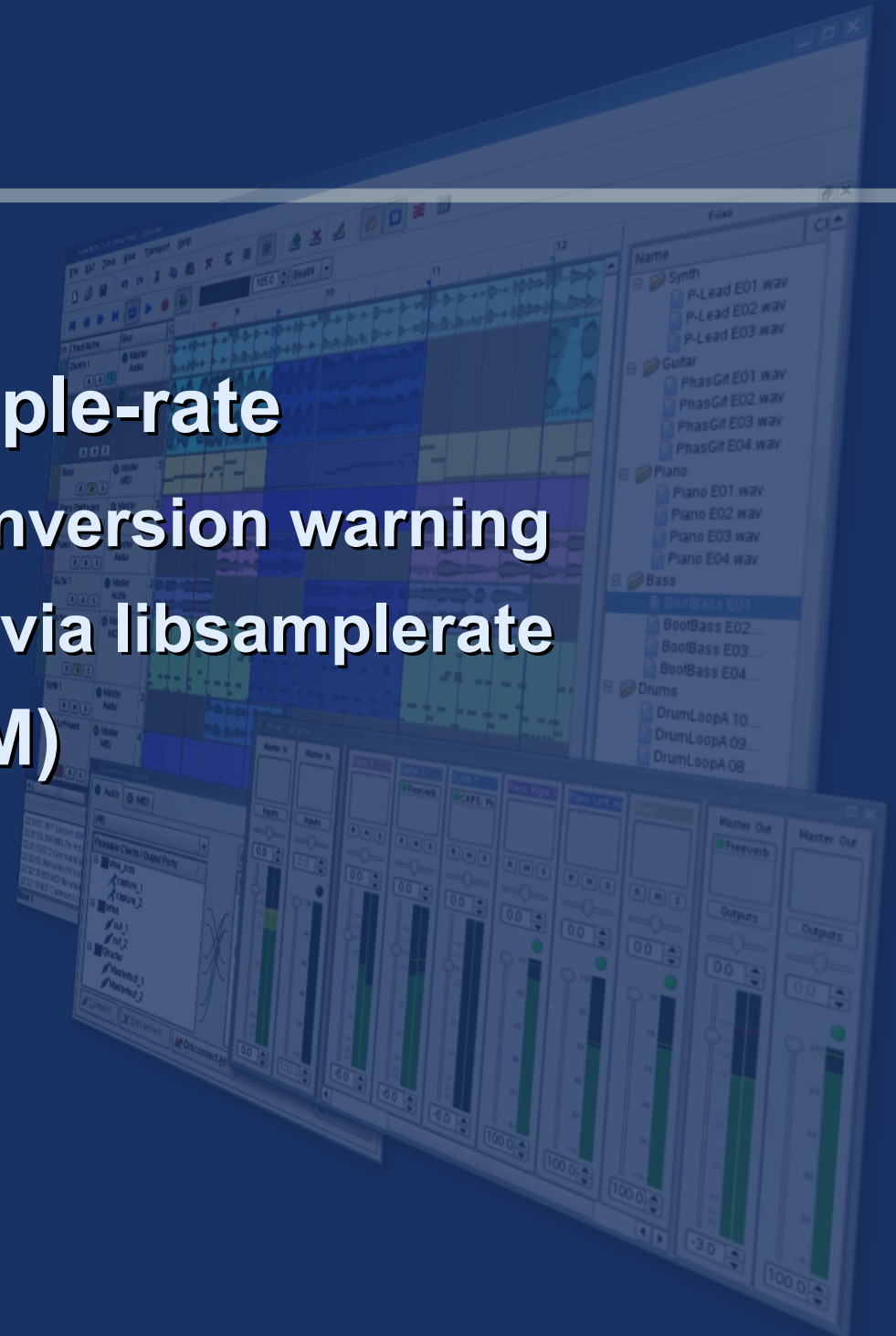- **Instruments**
- **Options**

Sessions (1)

- **XML encoded file**
  - **Properties**
  - **View state**
  - **Bus configuration**
  - **MIDI instrument map**
  - **Files**
  - **Tracks**
  - **Clips**

Sessions (2)

- **SDI application**
- **Locked to JACK sample-rate**
  - **Disparate session conversion warning**
  - **Playback conversion via libsamplerate**
- **Constant tempo (BPM)**
  - **No tempo map, yet**

Files

- **File selector / mini-organizer**
- **Hierarchical / tree list**
- **Drag-and-drop enabled**

Audio file support

- **libvorbisfile (ogg)**
- **libsndfile (wav, aiff, flac, au, ...)**
- **libmad (mp3)**

MIDI file support

- **SMF format 0 and 1 (home-brew)**

Clips (1)

- **Elemental items of session arrangement**
- **Whole or part of an audio / MIDI file**
- **Imported / Drag-n-drop into tracks**

Properties

- **Label (name)**
- **Location (start time)**
- **Offset**
- **Length**
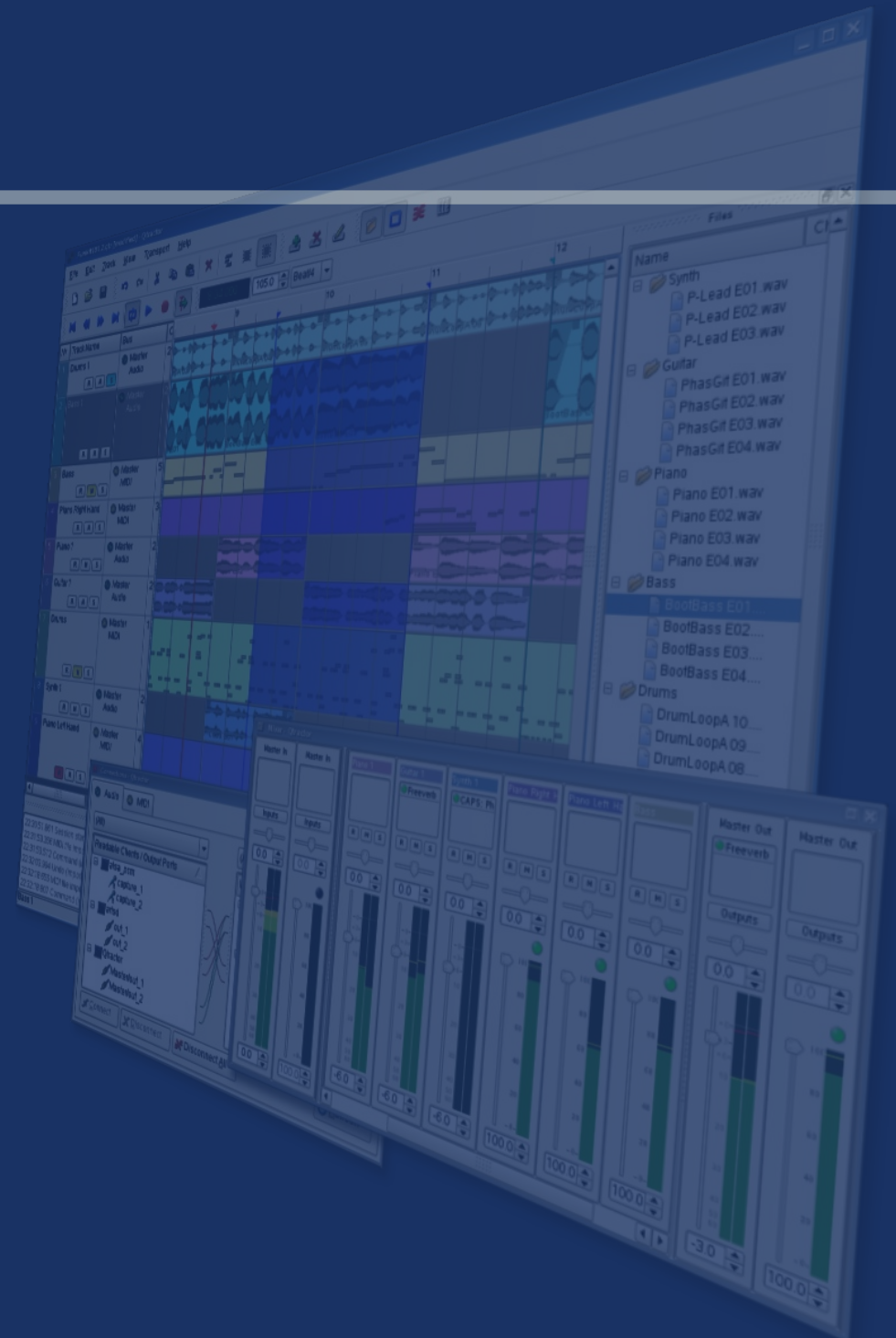- **Fade-in/out (linear, cubic, quadratic)**

Clips (2)

Selection (modes)

- **Clip**
- **Range**
- **Rectangular**

Editing (operations)

- **Cut**
- **Copy**
- **Paste**
- **Delete**
- **Drag / Move**

Audio Clips

Audio clips

- **Represent the whole or part of**
  - **One audio file**
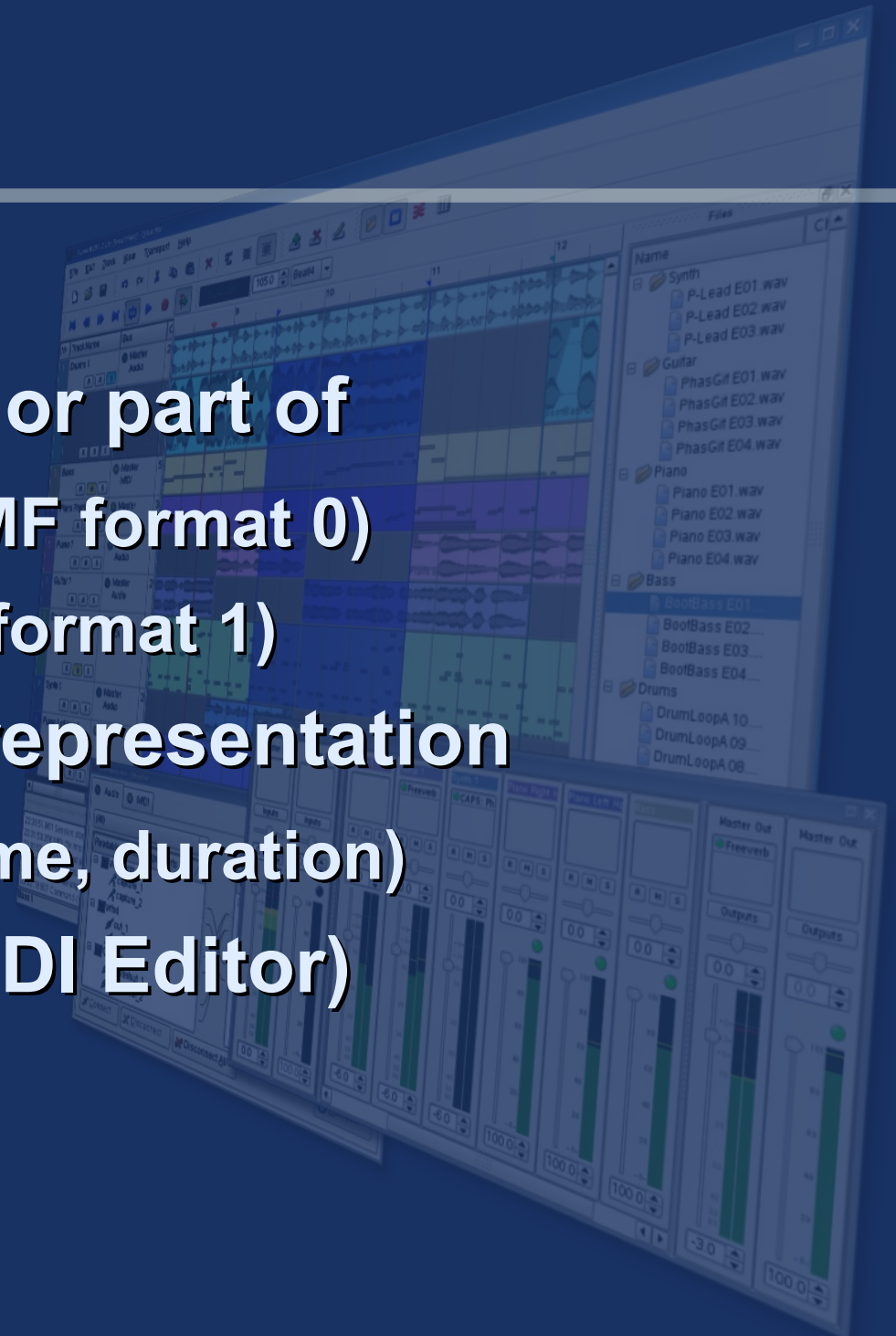- **Waveform graphical representation**
 - **Peak and RMS**

MIDI Clips

MIDI clips

- **Represent the whole or part of**
  - **One MIDI channel (SMF format 0)**
  - **One MIDI track (SMF format 1)**
- **Piano-roll graphical representation**
  - **Note events (pitch, time, duration)**
- **On-the-fly editing (MIDI Editor)**

Editing

- **Non-destructive**
- **All editing operations are parametric (location, offset, length)**
  - **Does not modify audio or MIDI files**
  - **Except: files created on recording, MIDI editor**
- **Undo / Redo fully enabled**
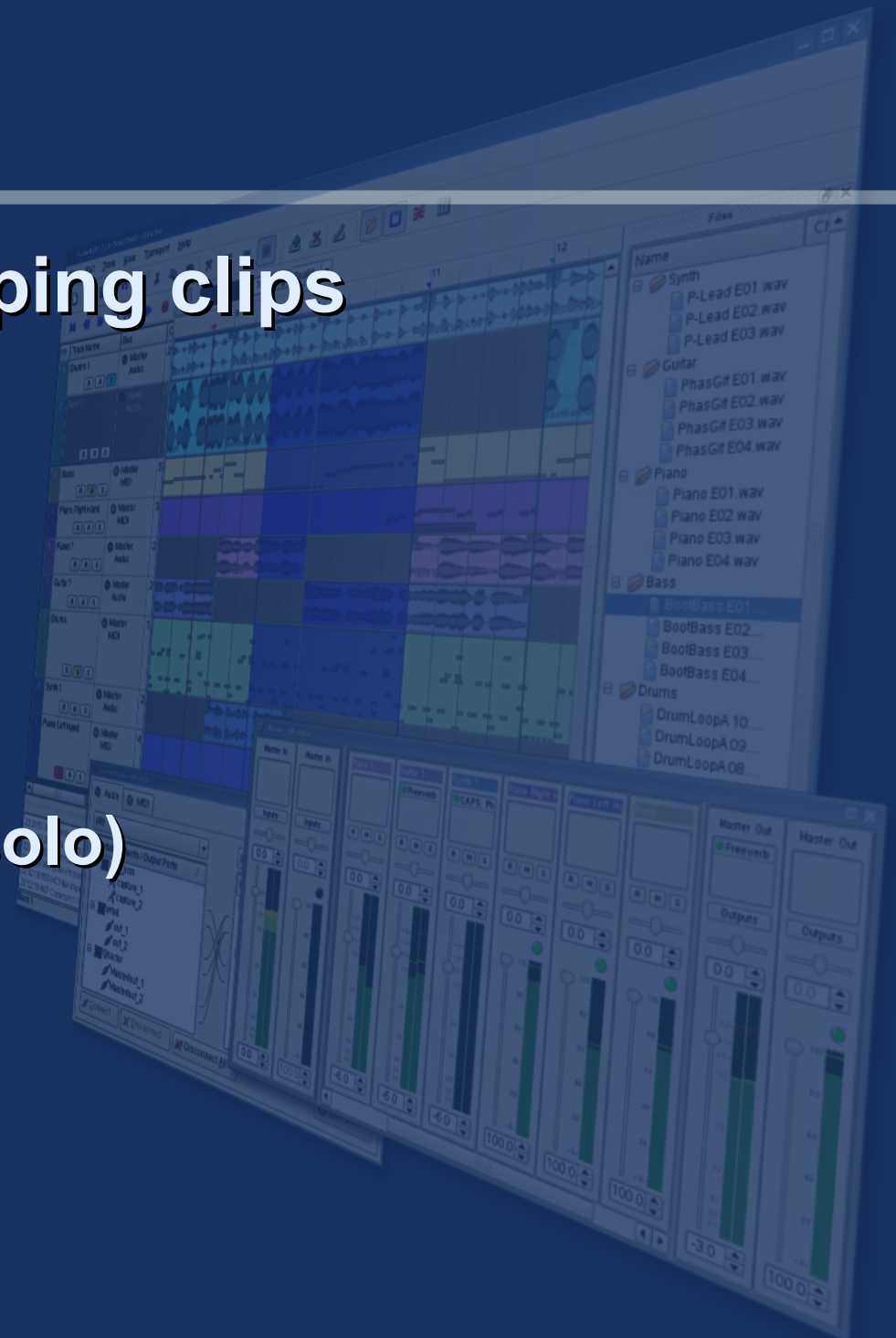- **Zoom and resizing**
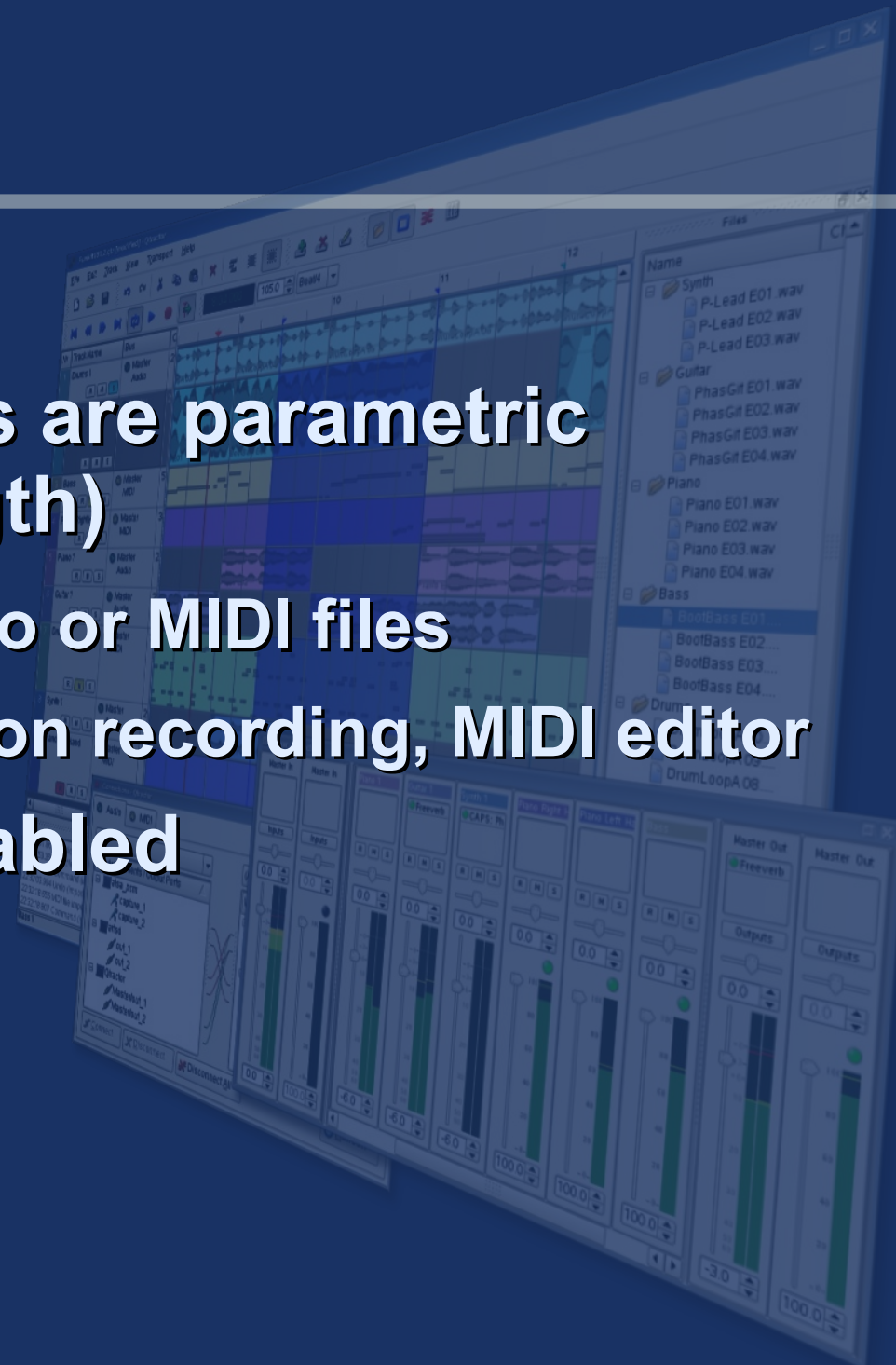
Tracks (1)

- **Sequence of overlapping clips**

Properties

- **Name**
- **Type (audio or MIDI)**
- **Input / Output buses**
- **State (record, mute, solo)**
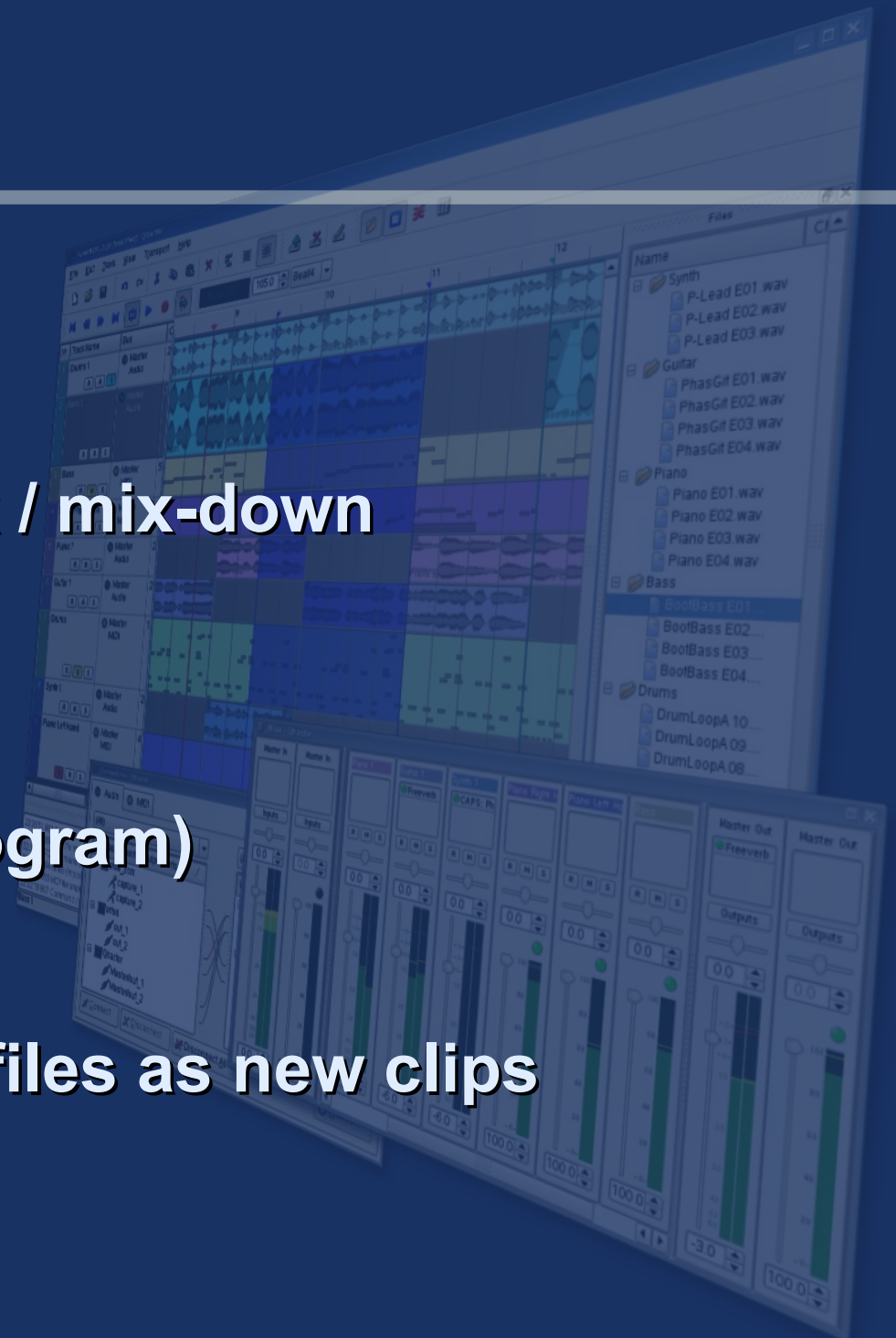- **Color**

Tracks (2)

Audio tracks

- **Input bus: recording**
- **Output bus: playback / mix-down**

MIDI tracks

- **Channel**
- **Instrument (bank, program)**

Recording

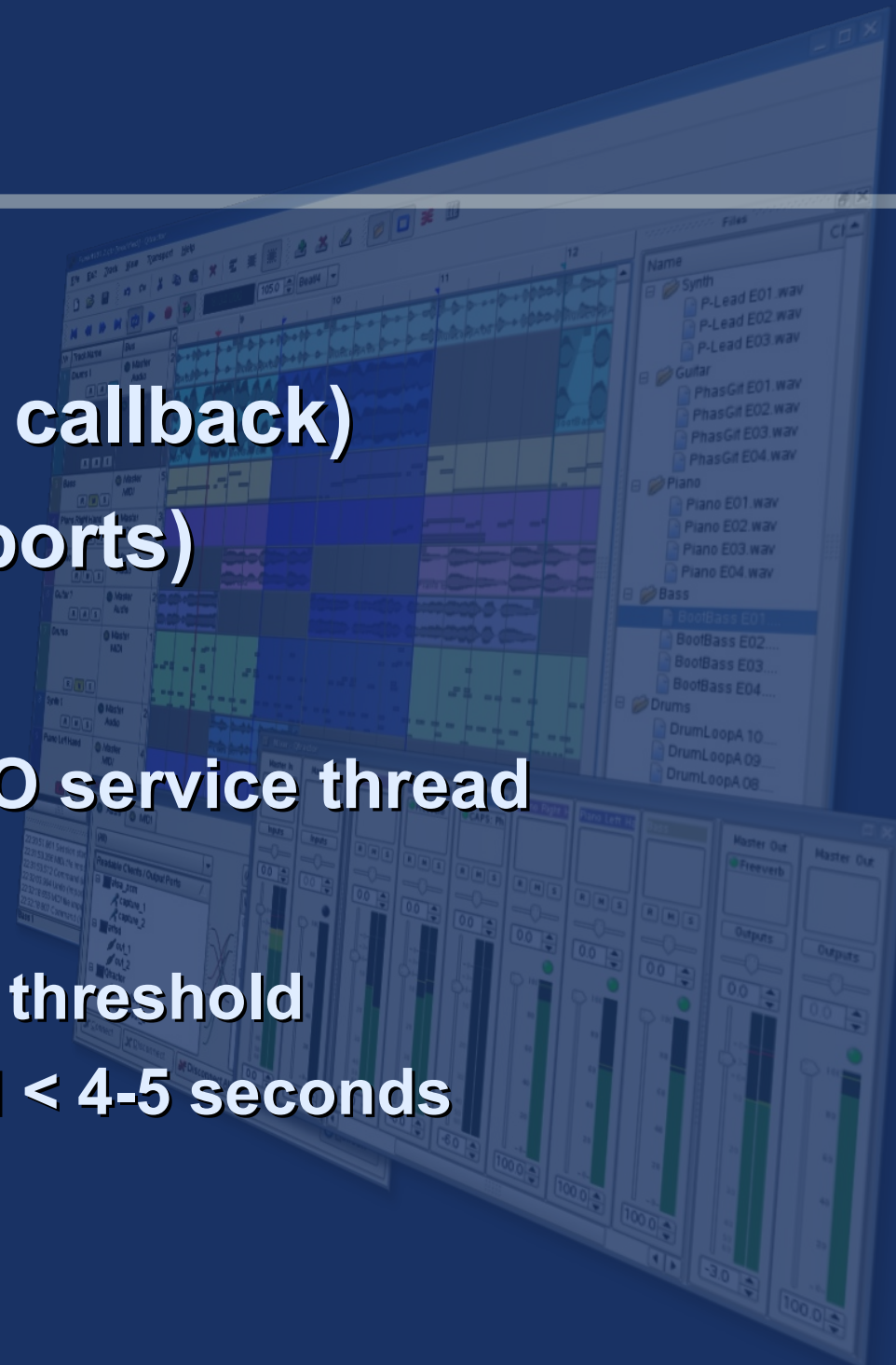- **Capture audio / MIDI files as new clips**

Audio Engine

JACK client

- **Master thread (JACK callback)**

- **Audio buses (JACK ports)**

- **Audio clips**
  - **One dedicated disk I/O service thread**
  - **Lock-free ring-buffer**
    - **Filled / emptied ~ 1s threshold**
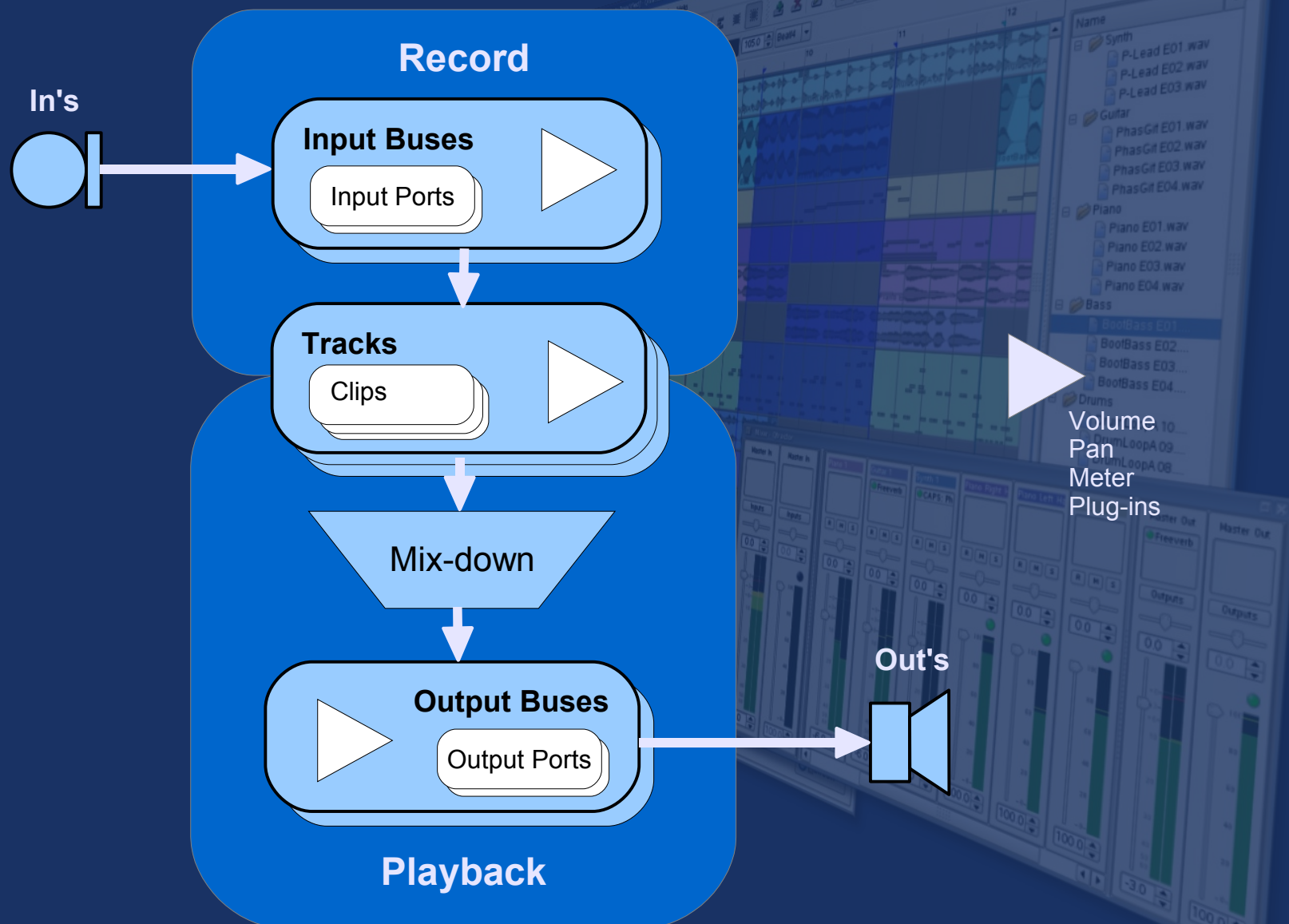   - **Permanently cached < 4-5 seconds**

MIDI Engine

**ALSA Sequencer client / queue**

- **Slave thread (MIDI output)**
- **Listener thread (MIDI input)**
  - **Inbound events multiplexed to record-armed track clips**
- **MIDI buses (ALSA seq ports)**
- **MIDI clips**
  - **Outbound events scheduled ~ 1 second period**
- **ALSA seq queue / port time-stamping**

Block Diagram (1)

In's

Record

Input Buses
- Input Ports

Tracks
- Clips

Mix-down

Volume
Pan
Meter
Plug-ins

Output Buses
- Output Ports

Playback

Out's

Engines & Buses (1)

- **Multi-threaded**
  - 1 Audio master thread (JACK process context)
  - N Audio ring-buffer disk I/O threads
  - 1 MIDI input thread
  - 1 MIDI output thread
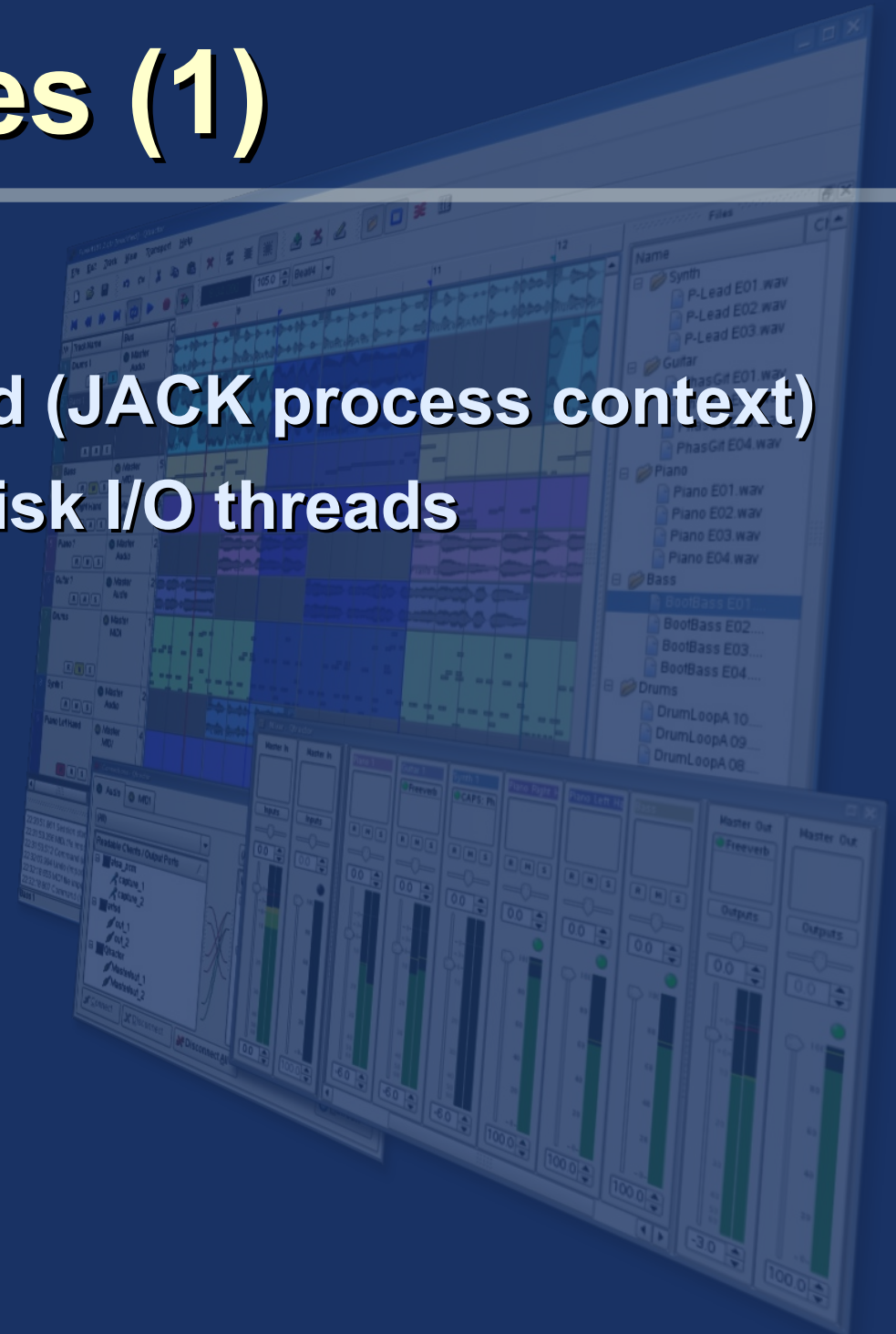
Engines & Buses (2)

- **Looping (playback)**
  - **Audio clip file-buffer service thread level**
  - **MIDI output thread process level**
- **JACK transport support**
  - **Soft-chase positioning**
  - **Buffer-period resolution**
- **MIDI Machine Control (MMC)**
  - **Transport control (rew, ffw, rec, shuttle, etc.)**
  - **Track arming record, mute, solo***

Engines & Buses (3)

Audio bus-track channel assignment

- **Input bus**
  - Determines the number of channels of recorded / captured files

- **Output bus**
  - Determines the number of channels on playback / mix-down
  - Automatic multi-channel mix-down resolution

Engines & Buses (4)
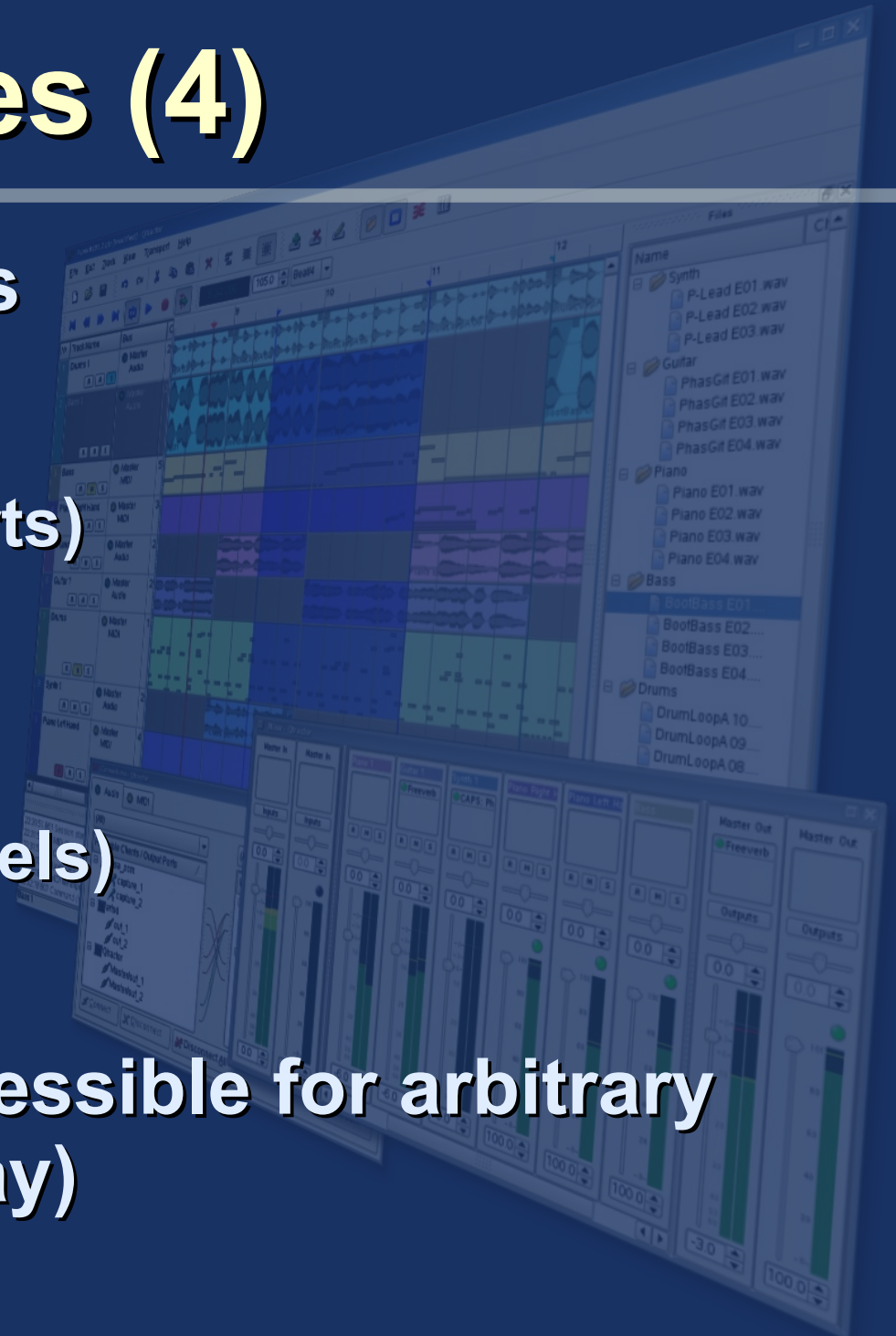
Default "Master" buses

- **Audio**
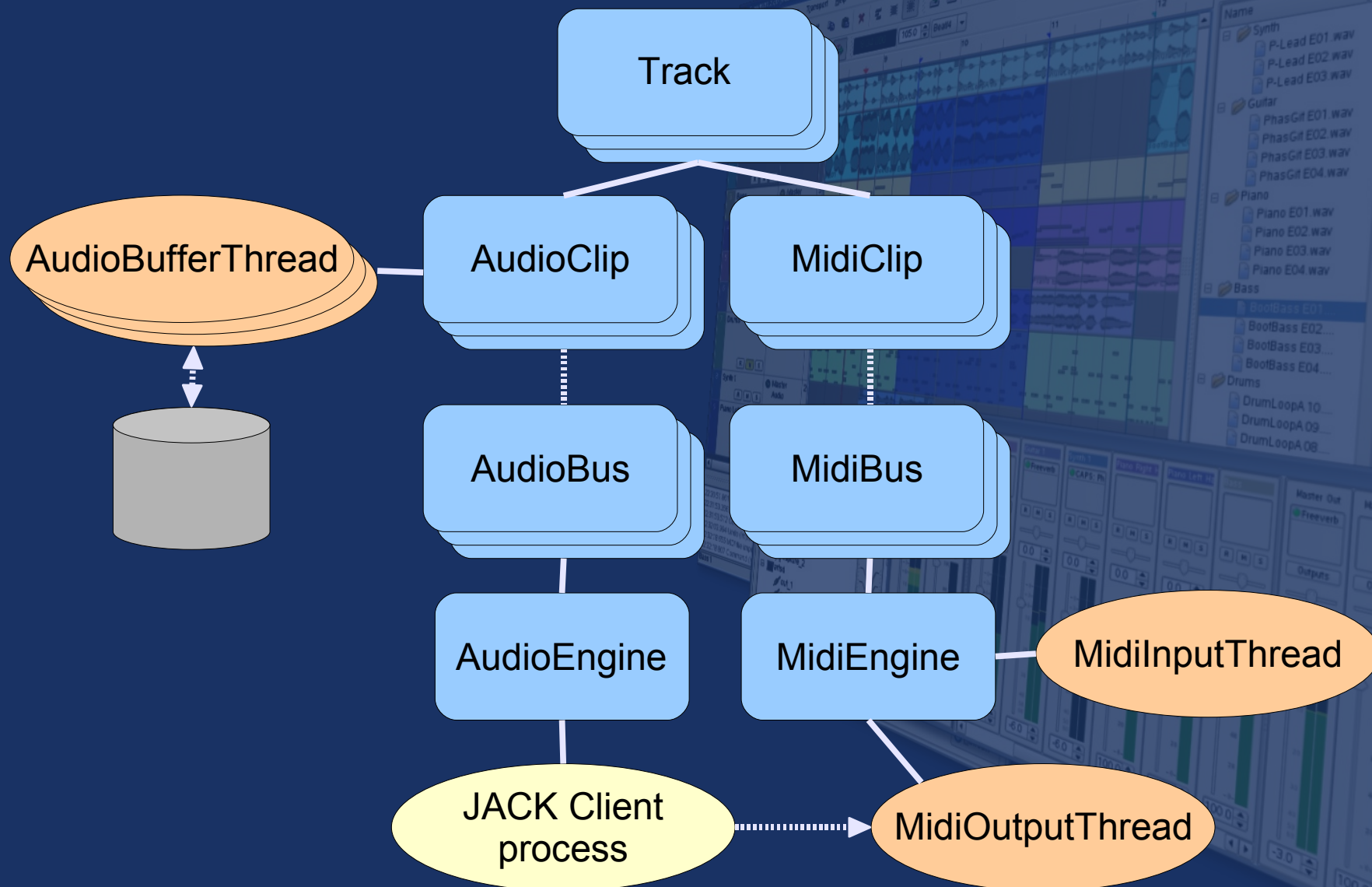 - **Stereo (2 channel ports)**
  - **Auto-connected**
- **MIDI**
  - **Single port (16 channels)**

- **All bus ports are accessible for arbitrary connection (patch-bay)**

Block Diagram (2)

Track

AudioBufferThread

AudioClip

MidiClip

AudioBus

MidiBus

AudioEngine

MidiEngine

MidiInputThread

JACK Client process

MidiOutputThread

Mixer

- **Session monitoring**
  - **Audio: peak level meters**
  - **MIDI: event activity, note velocity meters**
- **Input / Output bus connection control**
- **Track state control (record, mute, solo)**
- **Mix-down control (pan, volume)**
- **Mixer strips**
  - **Input buses | Tracks | Output buses**
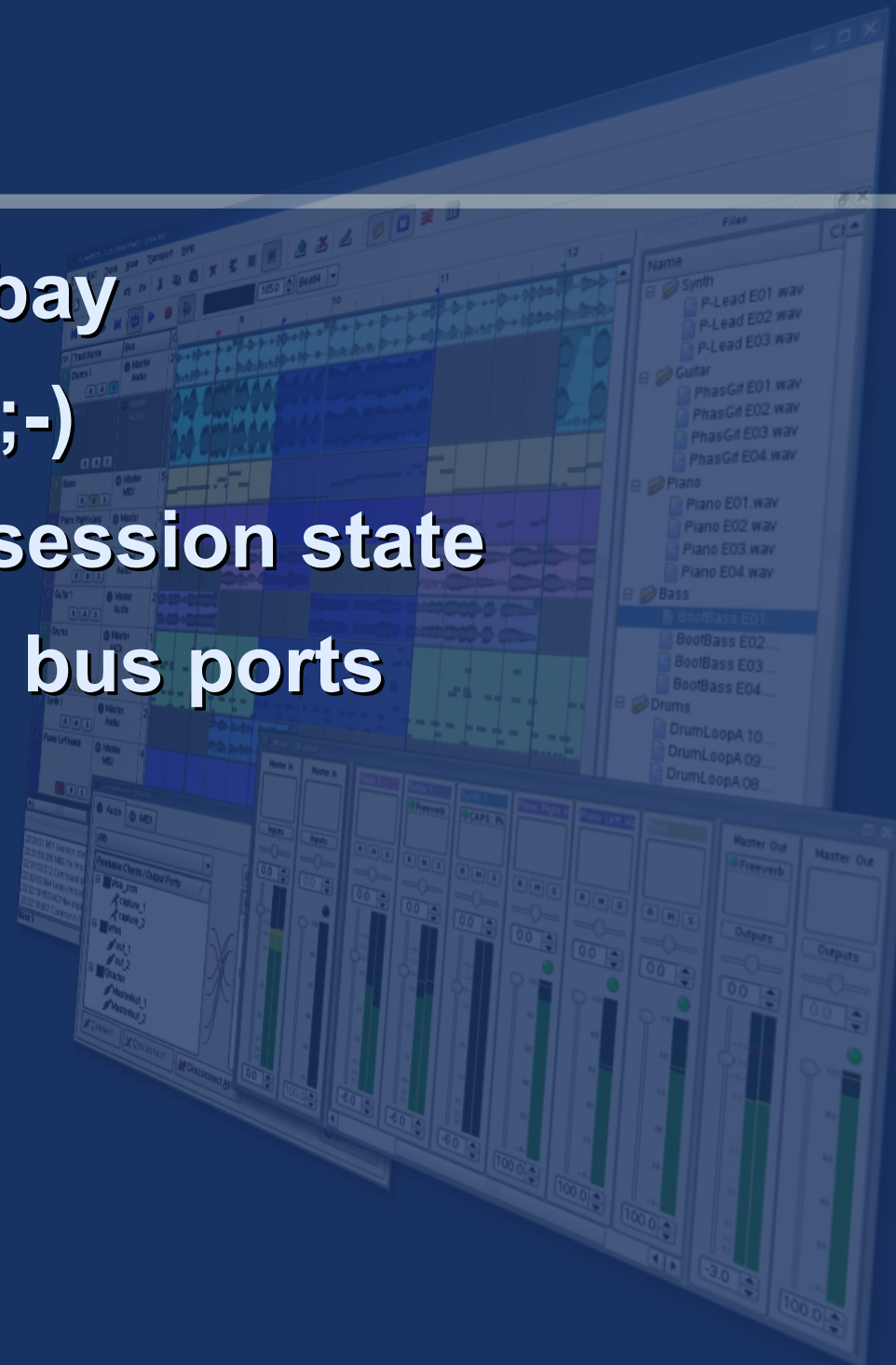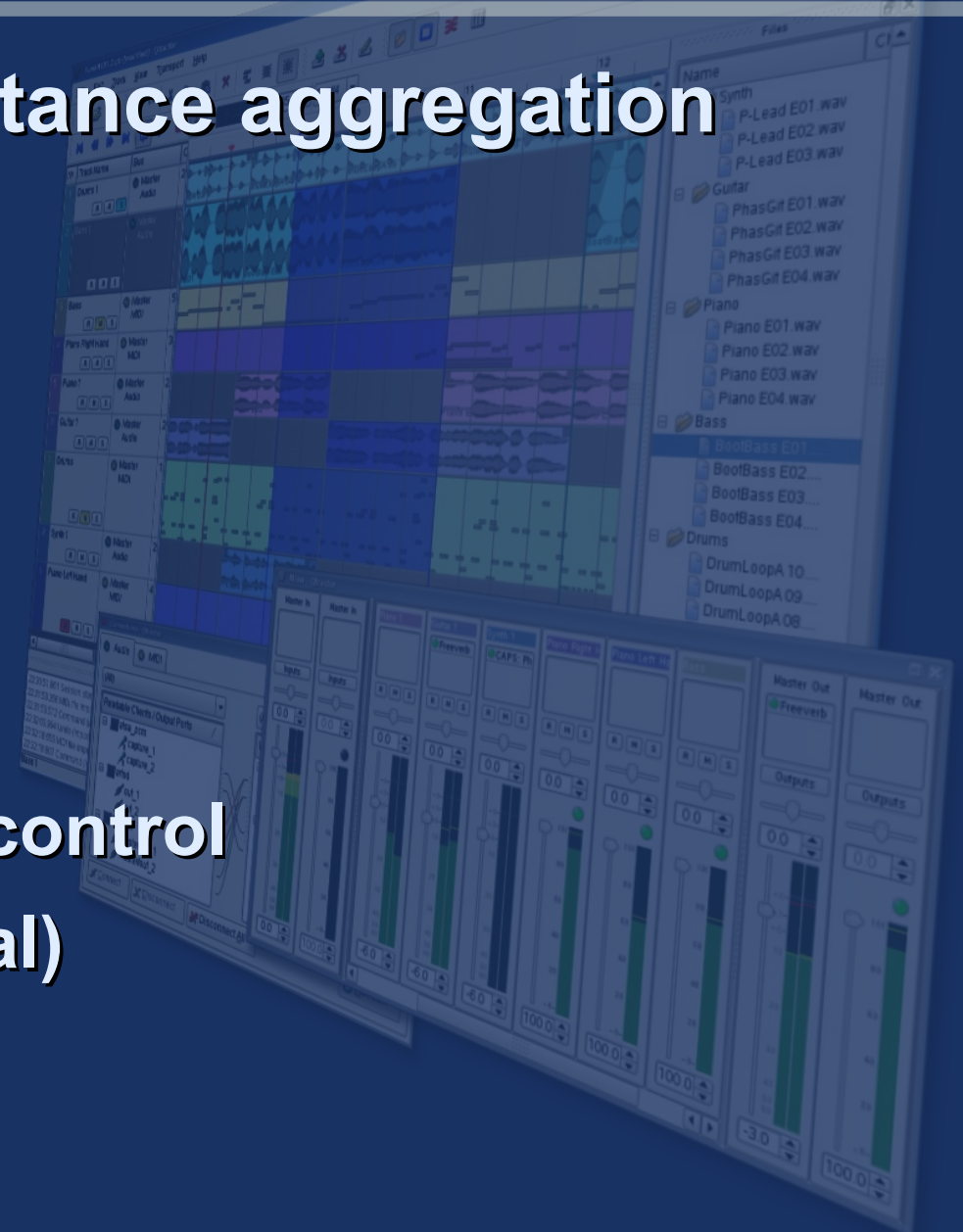- **Audio strips: plug-in effects chain**

Block Diagram (3)
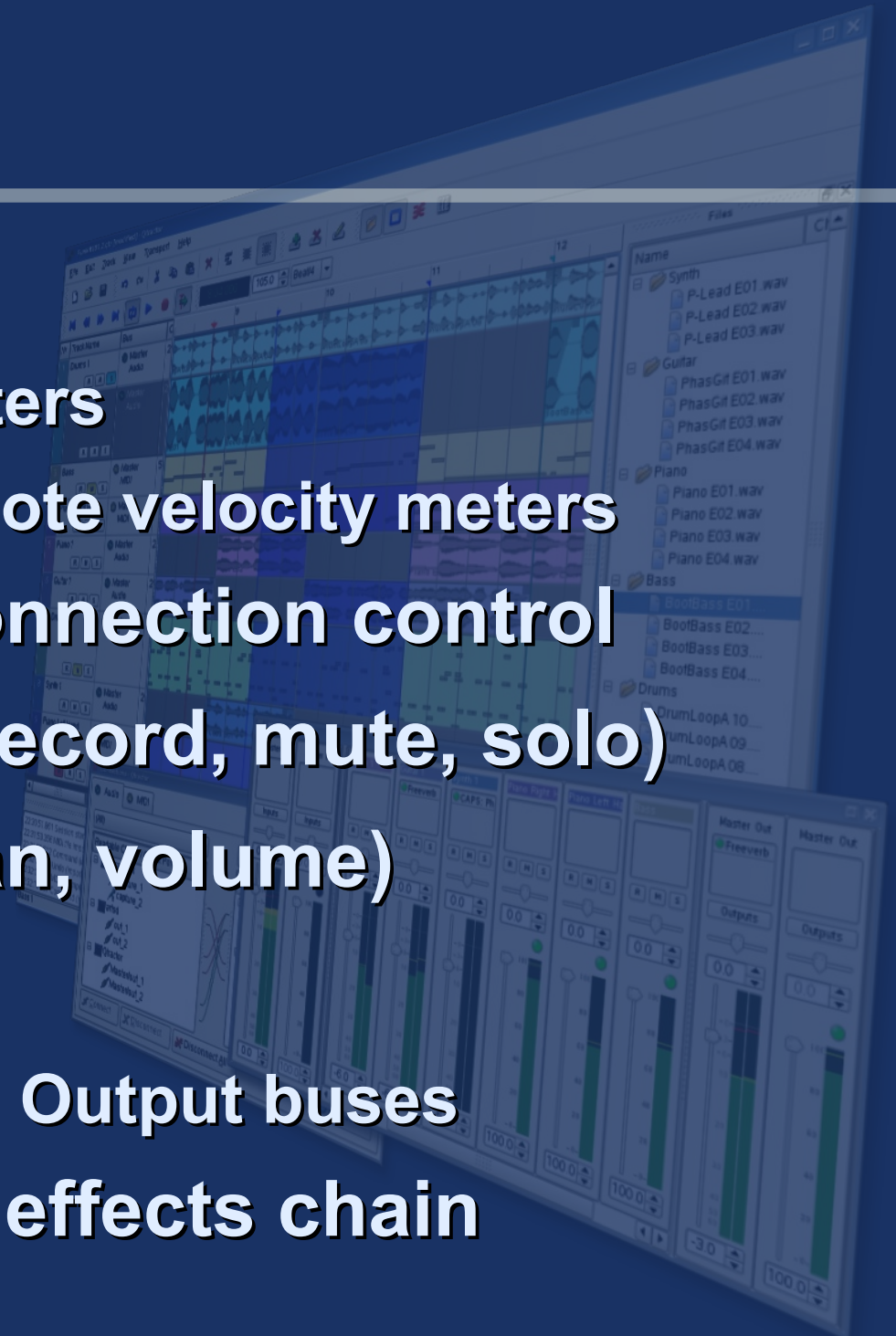
Connections

Audio and MIDI patch-bay

- **QjackCtl technology ;-)**
- **Saved / Restored as session state**
- **Not restricted to own bus ports**

Plug-ins (LADSPA, DSSI, VST)

- **Seamless plug-in instance aggregation**
- **Plug-in chain**
  - **Select & Edit (dialog)**
  - **Activate**
  - **Move (reordering)**
- **Plug-in dialog**
 - **Real-time parameter control**
  - **Named presets (global)**

MIDI Instruments

- **Cakewalk™ instrument definition files (.ins)**
  - Convenient MIDI bank-select / program-change instrument mapping per channel
  - Human-readable patch and key names
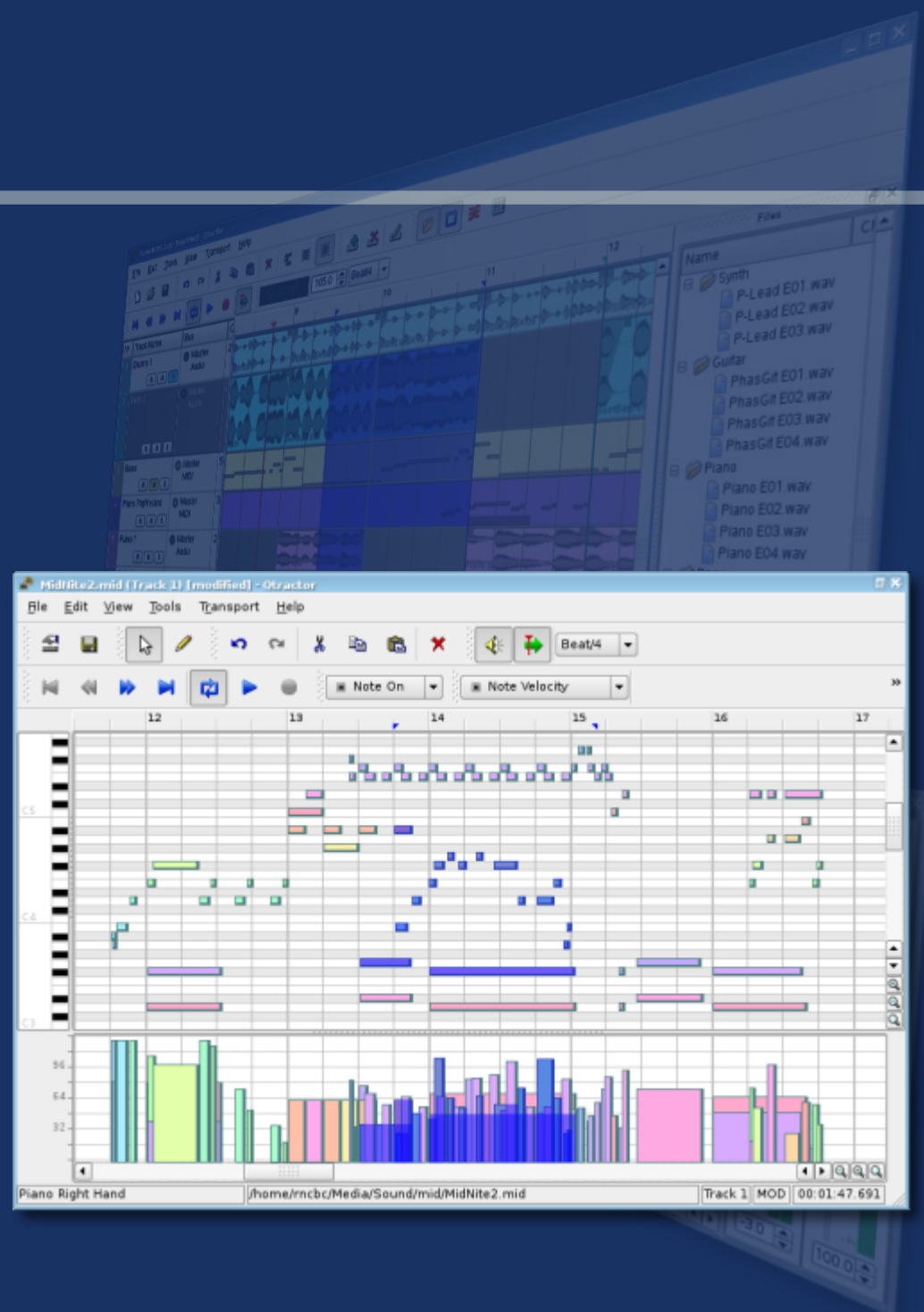 - One instrument map per MIDI bus (16 channels)
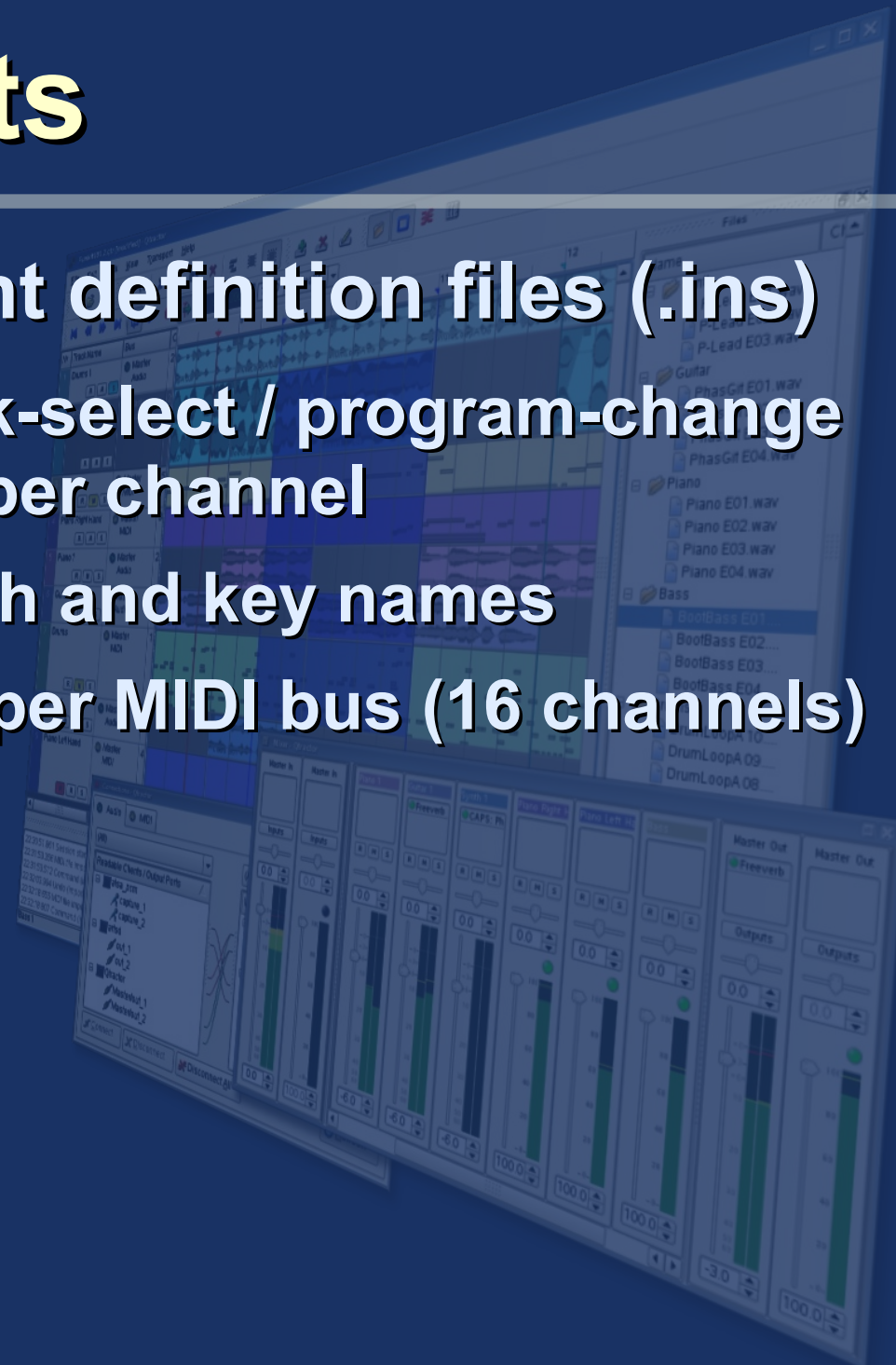
MIDI Editor (1)

- **Multi-extended selection**
- **On-the-fly editing**
  - **Drag / Move**
  - **Drag / Resize**
  - **Cut**
  - **Copy**
  - **Paste**
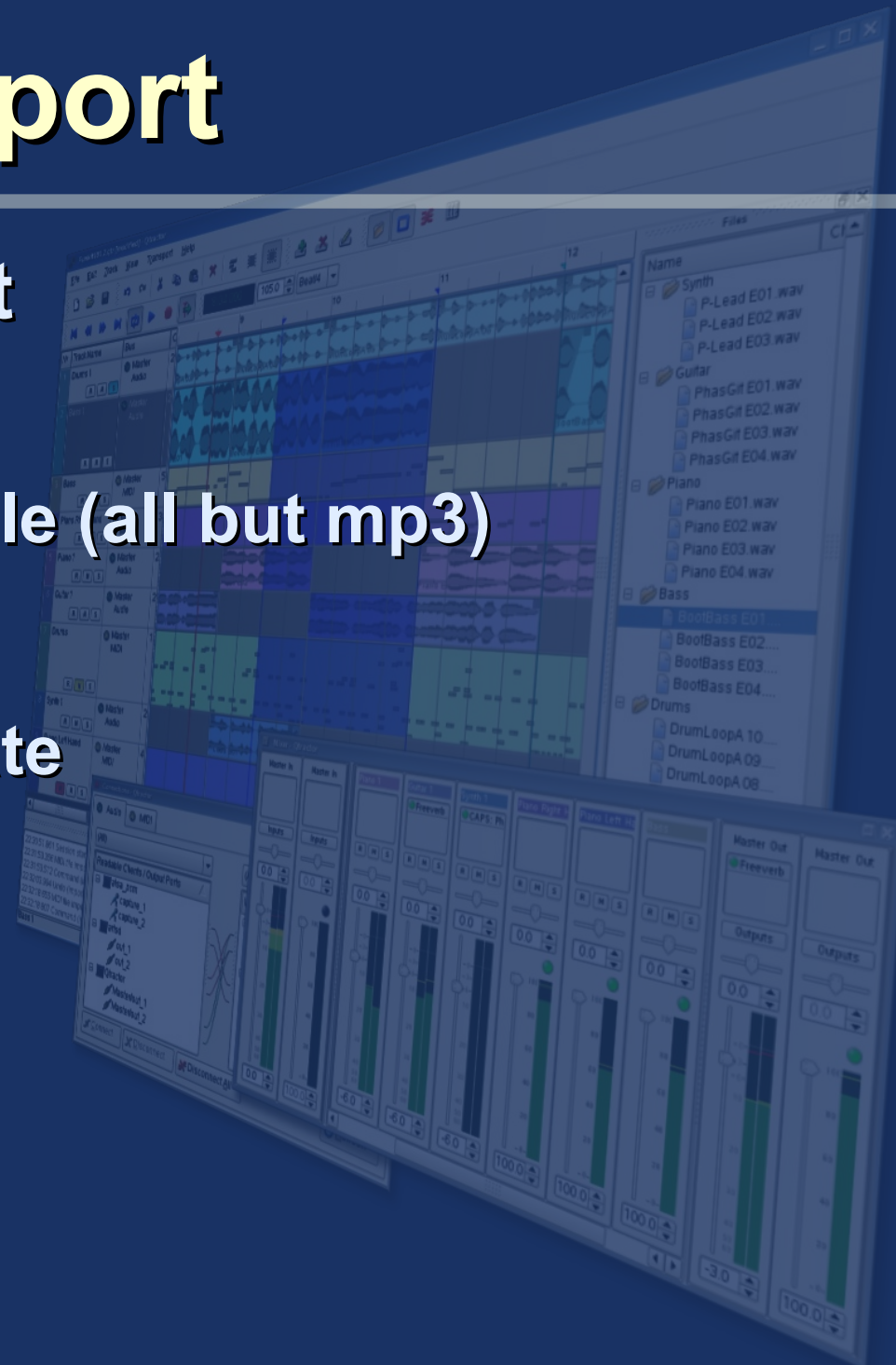 - **Delete**
- **Undo / Redo**
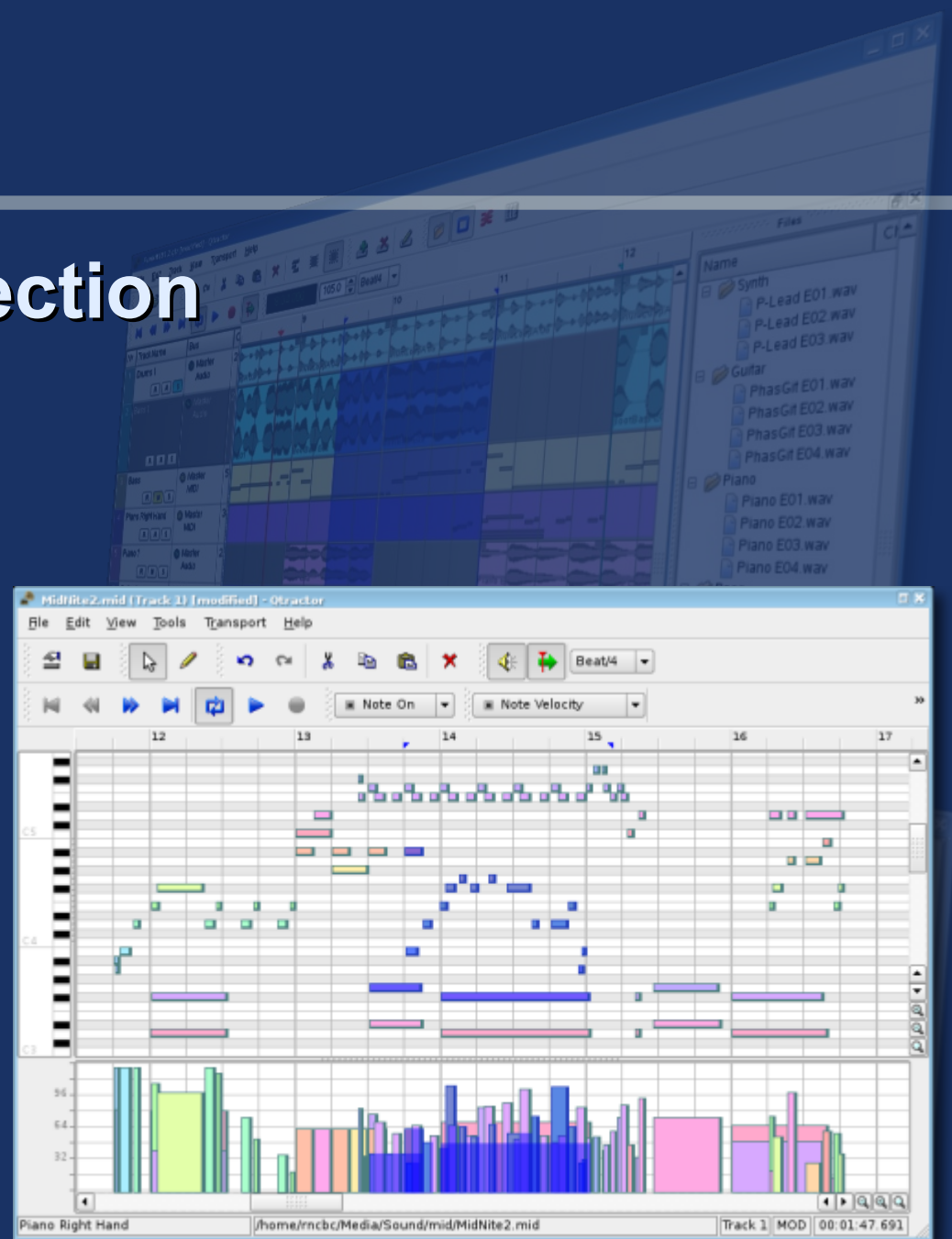
MIDI Editor (2)

- **Tools**
  - **quantize**
  - **transpose**
  - **normalize**
  - **randomize**
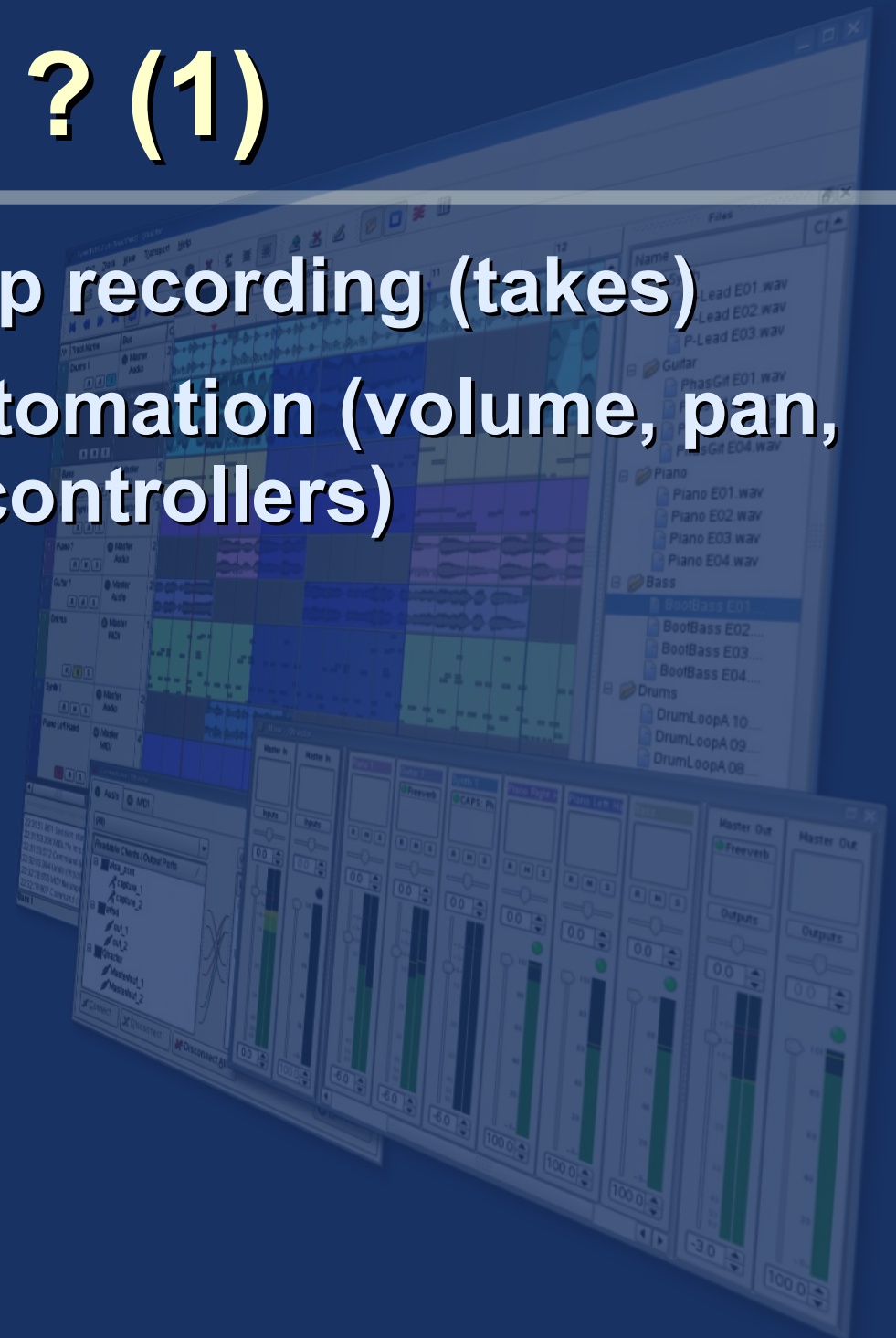 - **resize**

Audio / MIDI Export

- **Audio session export**
  - JACK freewheel
  - Mix-down / to audio file (all but mp3)
- **MIDI session export**
  - Merge and concatenate
  - SMF Format 0 or 1

What's missing ? (1)

- **Punch-in/out and loop recording (takes)**
- **Dynamic curves / Automation (volume, pan, plug-in parameters, controllers)**
- **Auto-cross fading**
- **Location markers**
- **LV2 Plug-ins**
- **JACK-MIDI**

What's missing ? (2)

- **MIDI Time Code / SMPTE**

- **MIDI Clock sync**

- **OSC interface**

- **Integrated scripting (angelscript?)**

- **Tempo and time signature map**

- **Your suggestion(s) here !**

Q & A

Qtractor

An Audio/MIDI multi-track sequencer

http://qtractor.sourceforge.net
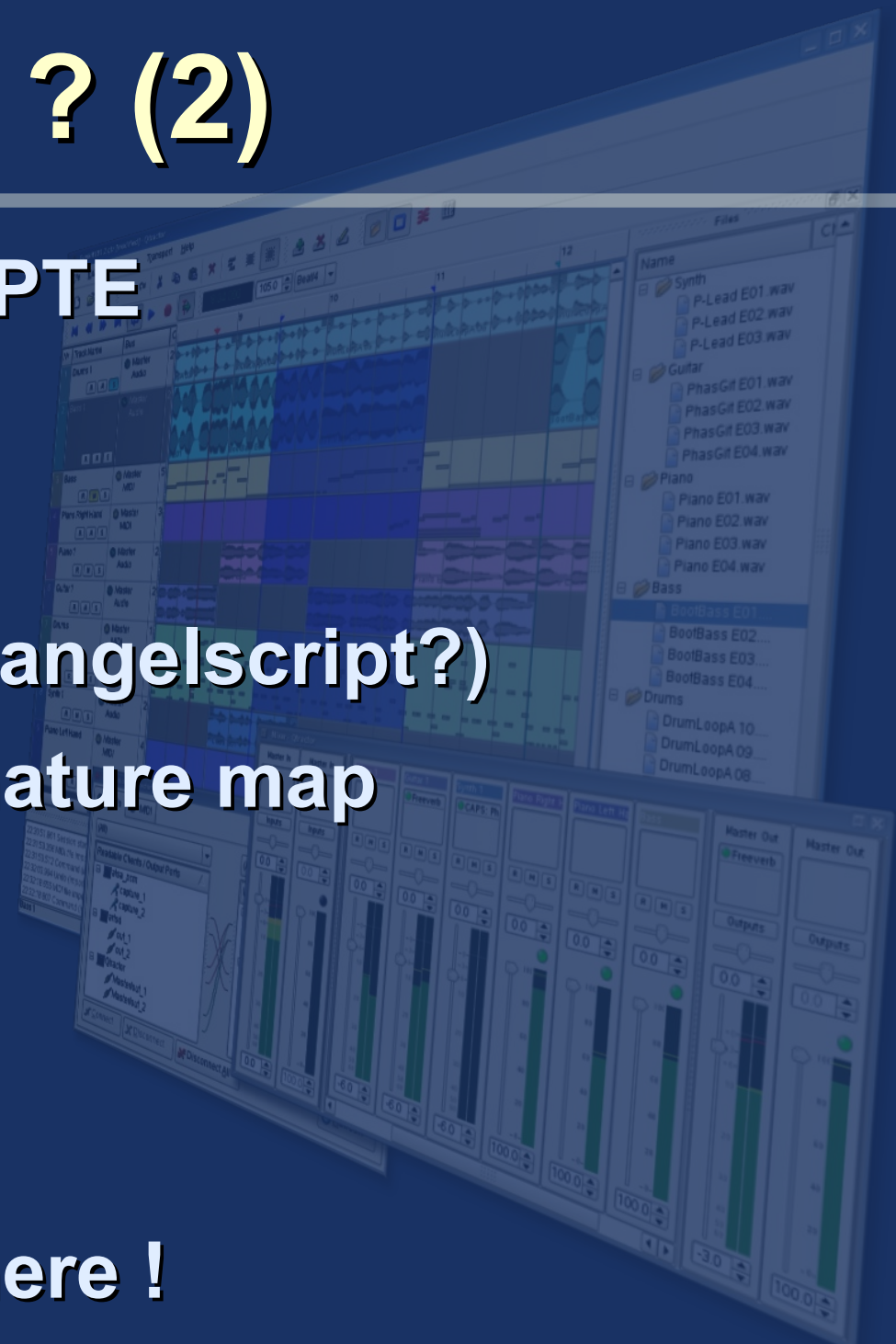
- **Qtractor is free / open-source software; you can redistribute it and / or modify it under the terms of the GNU General Public License version 2 or later.**

- **It is being possible through the knowledgeable, direct and / or indirect collaborative efforts of the Linux Audio Developers and Users communities.**

Thank you all.